Heating Piping & Air Conditioning

INDUSTRIAL • COMMERCIAL • INSTITUTIONAL • PUBLIC BUILDINGS

American Society of Heating and Air-Conditioning Engineers Journal Section—page 145

MARCH 1958

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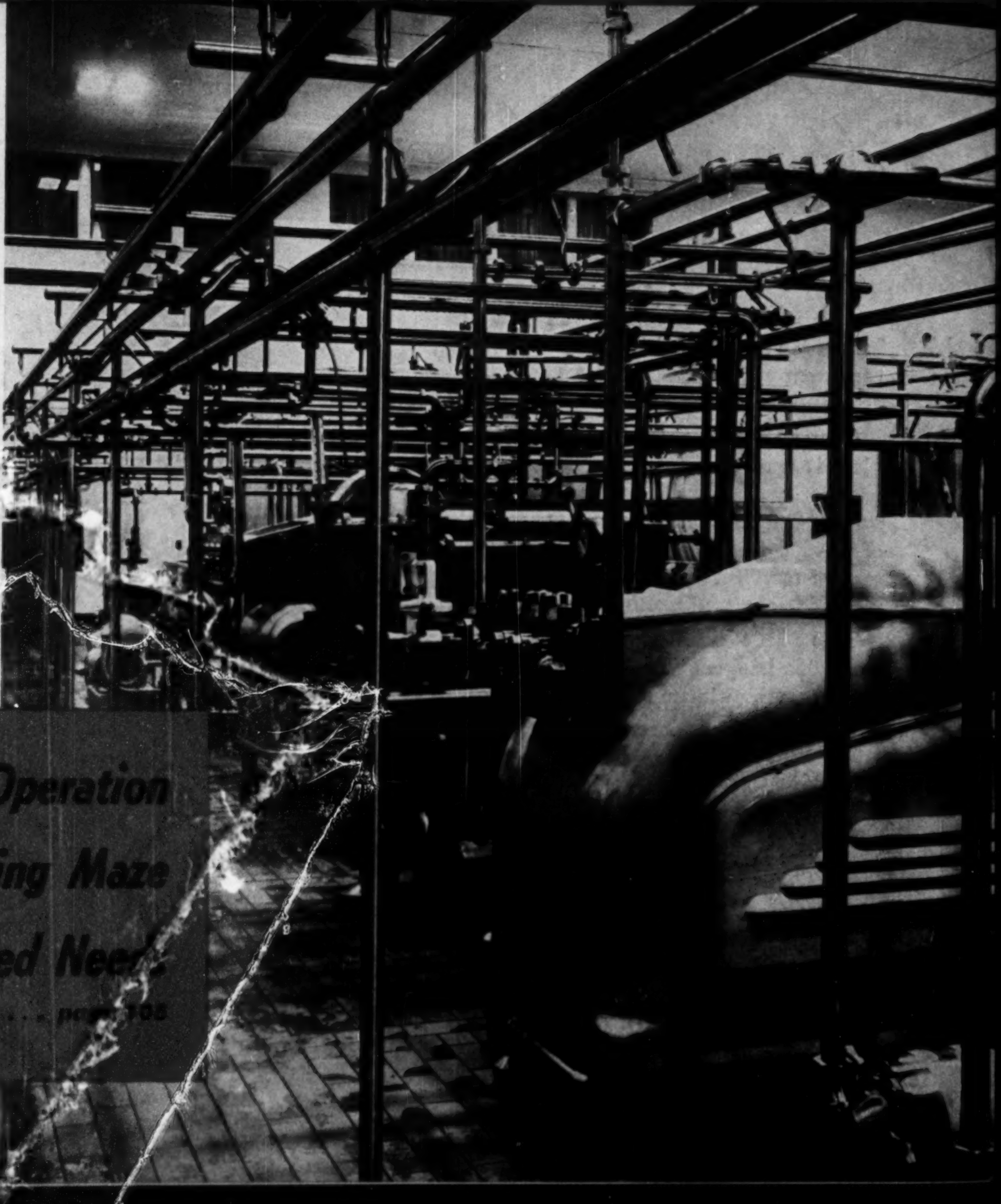
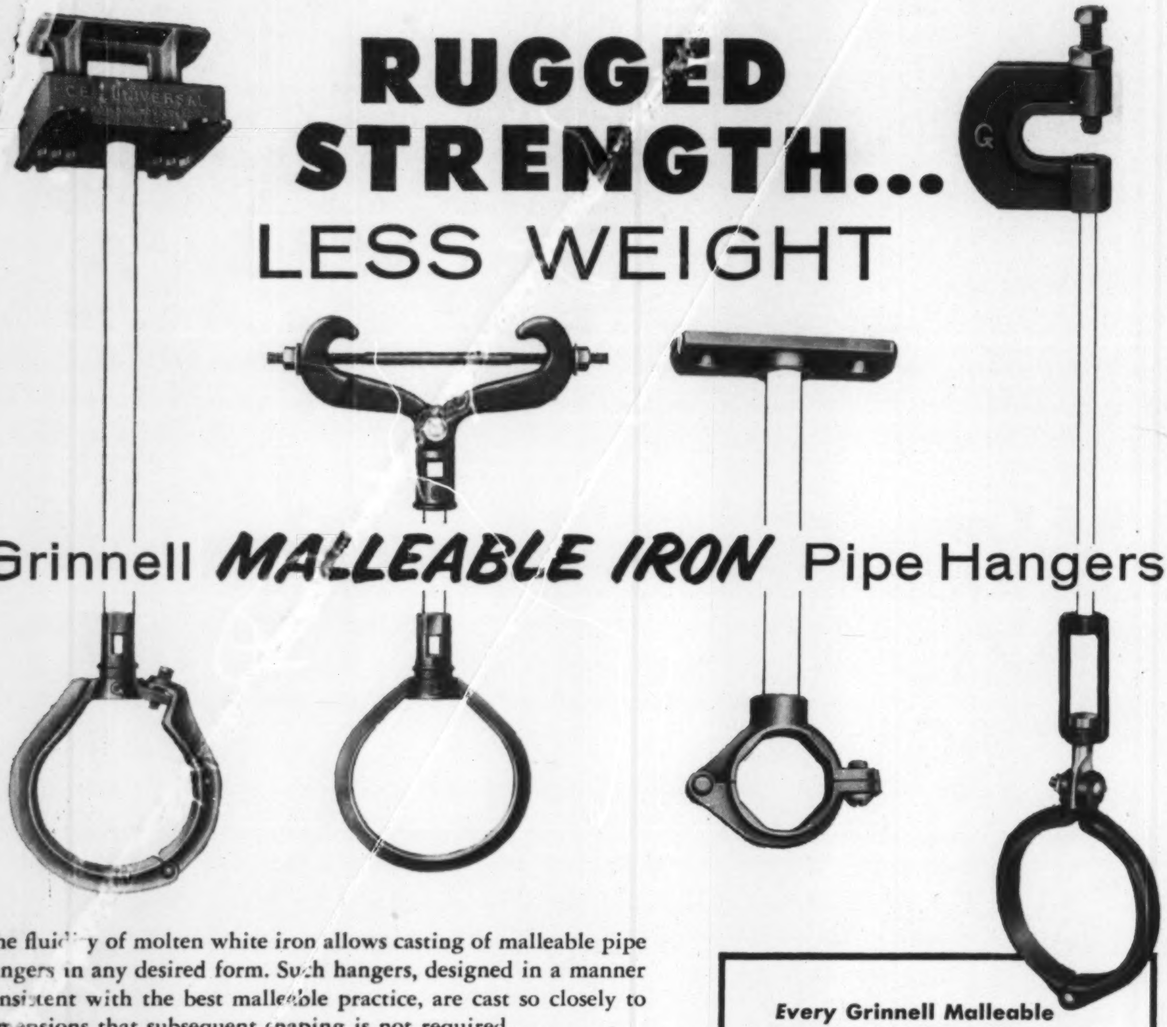


RUGGED STRENGTH... LESS WEIGHT

Grinnell *MALLEABLE IRON* Pipe Hangers

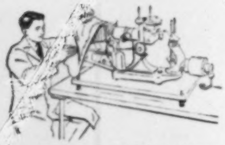


The fluidity of molten white iron allows casting of malleable pipe hangers in any desired form. Such hangers, designed in a manner consistent with the best malleable practice, are cast so closely to dimensions that subsequent shaping is not required.

Controlled annealing in the most modern equipment is employed to produce hangers having uniform internal grain structure, superiority ductility, high strength and freedom from casting strains. Quality controls in our foundries — such as hourly checks of metal, daily photomicrographs of metallurgical structure, tensile tests of sample bars from each melt — insure the rugged, lightweight strength of Grinnell malleable iron pipe hangers.

This start-to-finish manufacture by Grinnell assures malleable iron pipe hangers with a minimum safety factor of 5 or more, based on the ultimate tensile strength of the material.

The A.S.A. Code permits the use of malleable iron pipe clamps, embracing the pipe, when the temperature of the pipe does not exceed 450°F. When it does exceed this temperature, malleable iron may still be used in beam clamps, hanger flanges and the like if the malleable part is 12 inches or more distant from the pipe.



Testing metal structure with photomicrograph

Every Grinnell Malleable Iron Pipe Hanger offers . . .

- Safety Factor of at least 5
- Thickness of metal increased at points of concentrated stress
- Homogeneous metal composition throughout
- Extremely high resistance to impact and corrosion
- Economy
- Heat resistance up to 450°F

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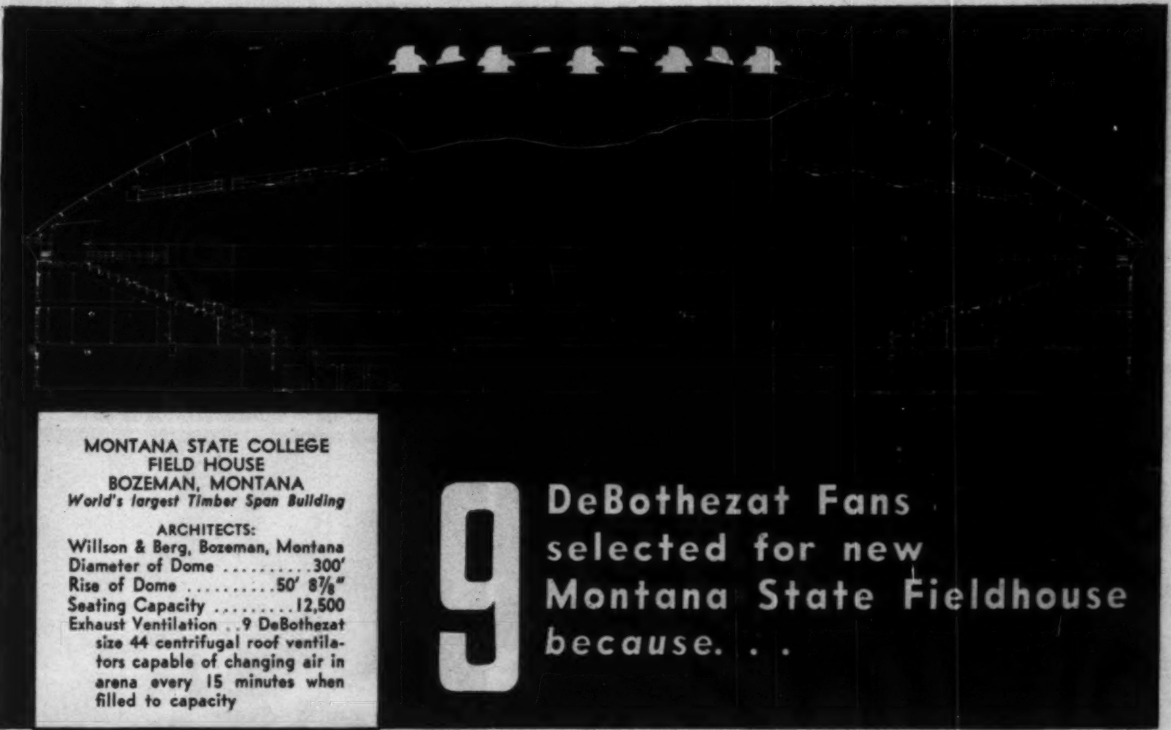
AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence, Rhode Island **Coast-to-Coast Network of Branch Warehouses and Distributors**

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems



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FIELD HOUSE
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ARCHITECTS:
Willson & Berg, Bozeman, Montana
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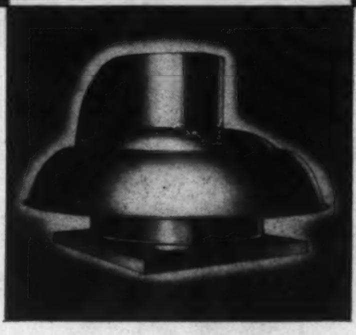
Seating Capacity 12,500
Exhaust Ventilation ..9 DeBothezat size 44 centrifugal roof ventilators capable of changing air in arena every 15 minutes when filled to capacity

9 DeBothezat Fans selected for new Montana State Fieldhouse *because. . .*



"OUR PRIMARY CONCERN IS QUIETNESS"

Putting their confidence in DeBothezat's published performance and sound level ratings, R. L. Prussing Engineers achieved effective ventilation of this sensational arena, without creating undesirable noise. Thus spectators will never have to endure a sports event, concert or lecture with ventilating equipment shut off because of noise — a frequent occurrence in other buildings of this type, according to the Billings, Montana, engineering firm.

Both inlet and outlet sound output ratings, and performance ratings backed by a $250,000 performance bond are available for every DeBothezat fan — the completely assembled unit. Next time you specify or install fans, ask your DeBothezat sales engineer for full information. Or write Dept. HP-358.

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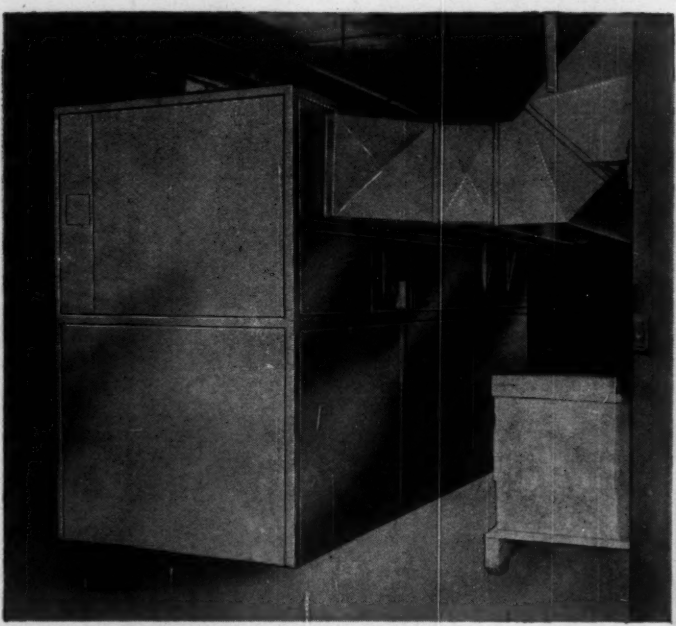
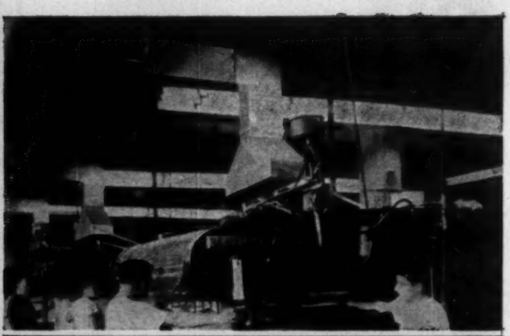


Engineers and Contractors: Tryon, Inc., Springfield, Mass.



SIMPLE TO SPECIFY...
SIMPLE TO INSTALL...
pre-engineered 'CPU' Air Conditioning Package

by DUNHAM-BUSH

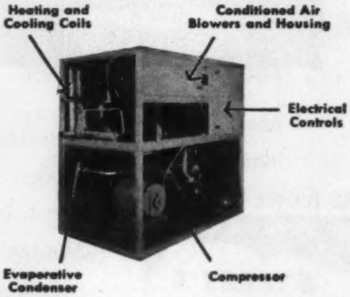
Proper control of humidity is an important consideration in a printing plant. At General Offset and Printing Company in Springfield, Mass. the decision was made to air condition the paper storage area, pressroom and "stripping" room.

Once this had been decided, top management executives naturally wanted the installation made quickly.

A Dunham-Bush 'CPU' Pre-Engineered air conditioner was selected. This unit is a complete air conditioning *system* housed in one cabinet—containing evaporator, compressor, evaporative condenser and pump, fans, motors, piping and controls.

Installation required only connection of power supply to control panel, connection of water make-up line and necessary duct connections.

For *your* next air conditioning job, why not eliminate specification and installation worries by selecting a Dunham-Bush 'CPU' Commercial Package Unit.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Heating Piping & Air Conditioning

Vol. 30, No. 3

(With which is merged the Aerologist)

DESIGN, INSTALLATION, OPERATION
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Why Every Steam Heated Unit Needs its Own Steam Trap

... the theory, practice and proof of "unit trapping" for top temperatures

Using an individual trap for each steam heated unit, including each separate coil, chest or chamber of a machine—pays off for the user.

Here are just two examples:

1. On a creamery dryer

Drainage Method	*Air Temperature*
Restricted Blow-thru	250°
Group trapping (1 trap for 8 coils)	225°
Armstrong Unit Trapping (8 traps—1 for each coil)	**309°**

2. On a platen press

Drainage Method	*Processing Time*
Restricted Blow-thru	50 minutes
Group Trapping	35 minutes
Armstrong Unit Trapping	**25 minutes**

Why Unit Trapping Works Best

It is reasonable to assume that no two steam heated units will have *identical* condensing rates. Even the slightest difference in rate will cause a difference in steam pressure drops through the units. Here's where the trouble starts. Condensate from each unit may flow to the trap. But, what about air and other non-condensibles in the system? A difference in pressure drops too small to be indicated by an ordinary pressure gauge will permit backflow of steam from the higher pressure units to the lower pressure units. This backflow of steam may even impede flow of condensate from the lower pressure unit to the trap . . . and it will definitely impede or block off flow of air to the trap. The result is sluggish heating, reduced temperatures, reduced output, fuel waste and increased possibility of corrosion. Figures 1, 2 and 3 diagram the action.

How Different Condensing Rates Can Slow Production

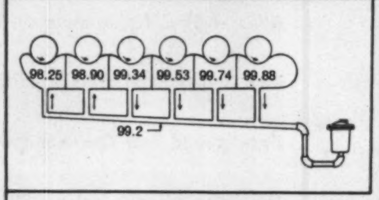


Fig. 1 This is a 6-roll ironer shortly after it has begun operating on 100 psi steam. When cold, wet material passes over chest 1, steam condensing rate is high and pressure drops accordingly. The pressure drop in chest 2 will not be as great, and so on down the machine as the material becomes progressively hotter and drier. Average pressure in the chests then is 99.27 lbs., and drain header pressure is slightly less, about 99.2 lbs. Under these conditions, steam from drain header enters chests 1 and 2 (as indicated by arrows at side of drain lines) because of pressure difference. Though condensate from chests drains by gravity, air can't leave chests countercurrent to incoming steam. Fig. 2 shows what happens next.

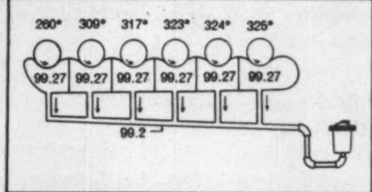


Fig. 2 This is the same 6-roll ironer after it has been operating a while. Air has accumulated in chests 1 and 2, reducing condensing rate and decreasing pressure drop. This process repeats itself down the line until pressures are as shown—that is, enough air will accumulate in each chest so that condensing rates and pressure drops of all chests will be about equal. The net result is shown in chest temperatures which are actual pyrometer readings taken on a 6-roll ironer, drained by a master trap, in a Chicago laundry. The laundry was making 337.9°F steam, but getting an average of only 309.6°F from the ironing surfaces, necessitating slow operation and frequent reruns. Then they tried Armstrong unit trapping—see Fig 3.

How Unit Trapping Prevents Trouble

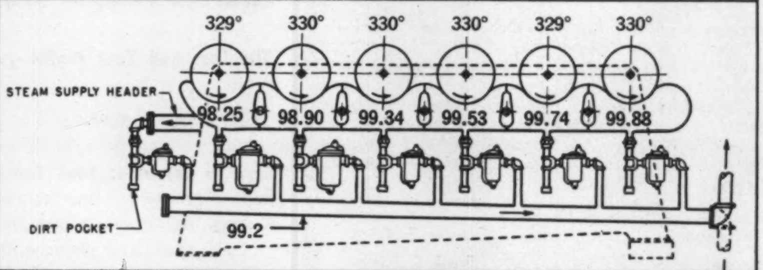


Fig. 3 This is the same 6-roll ironer, now unit trapped. Temperatures shown are also actual pyrometer readings—the average of 329.6°F is 20° higher than with group trapping. This is because air is continually removed from each chest into the drain header, and cannot get back into any chest.

Unit Trapping Not Costly

No engineer wants any more mechanical devices in his plant than are absolutely necessary. But, the moderate additional cost of using two or more small traps, instead of one big one, is saved over and over again in improved efficiency.

If the traps are Armstrong, maintenance is no problem. And users frequently tell us that Armstrong traps outlast others two and three to one.

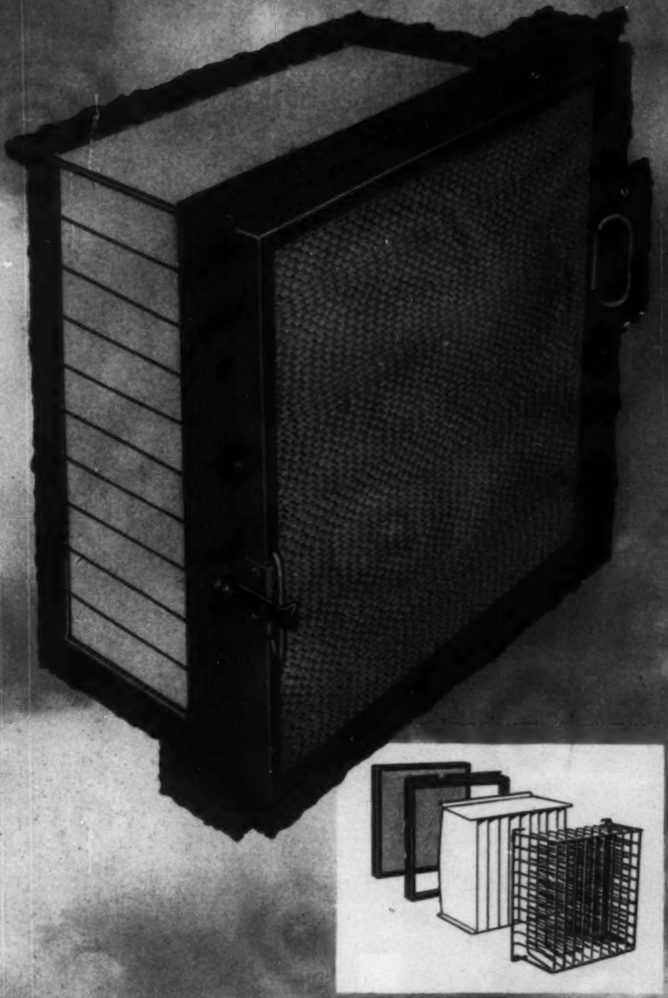
Steam traps usually represent a fraction of 1% of the cost of the equipment they drain. Does it make good sense to lose 10% or more of equipment capacity to save a few dollars on traps?

Why not test Armstrong unit trapping in your plant. If you are not completely satisfied with the results you can return the traps for a full refund of the purchase price. There is little to lose—lots to gain. Call your local Armstrong Factory Representative or Distributor, or write **Armstrong Machine Works, 8743 Maple St., Three Rivers, Mich.**

ASK FOR the 44-page Steam Trap Book and reprint of article on Unit Trapping.

801ST

ARMSTRONG STEAM TRAPS



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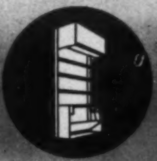

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dry type filter.
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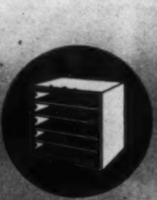

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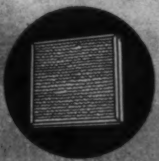

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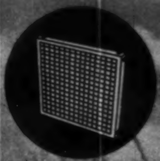

D/C FILTER
Disposable
media filter.
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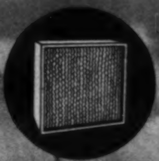

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Particulate filter.
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Giant Computers are made here

Architect: **L. Rossetti**

Engineers: **R. F. Giffels and V. E. Vallet, Detroit, Mich.**

Contractors for heating and air conditioning:

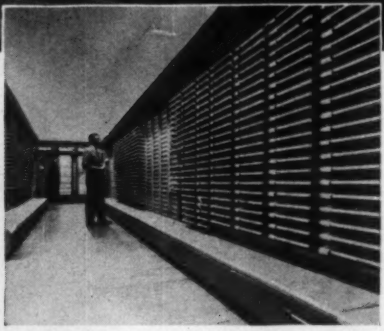
Rowland Tompkins & Sons, Hawthorne, N. Y.

Carrier Corporation, New York City—subcontractor

INTERNATIONAL BUSINESS MACHINES CORP. MILITARY PRODUCTS PLANT, KINGSTON, NEW YORK

Focal point of the SAGE Air Defense System is the round scope portion of Display Console shown in photo at right. It can depict the over-all battle or focus on part of it. Powers Precision Control of Temperature and Humidity is important in all spaces shown here at the IBM Kingston Plant

One of the SAGE Air Defense System Display Consoles.



Input frames (front view) thru which all radar information is processed.

View of Pluggable Unit Assembly department.

One of many Quality Control areas.

View of Manufacturing-Engineering department.

where Employees both THINK and work better in proper Thermal environment provided by

POWERS AIR CONDITIONING CONTROL SYSTEMS

Symbol of Quality Control and Economy

In this big modern IBM plant at Kingston, N.Y. are produced the world's largest electronic digital computers, which mastermind the famous SAGE Air Defense System. In minutes the system can detect a foe approaching by air, determine its course and even guide an interceptor to meet the attacker. SAGE is a masterpiece of automation.

The SAGE computer comprises over 200 separate units, occupying floor space equal to 24 average ranch style homes. It uses as much power as a town of 15,000 and it generates an immense amount of heat. Proper cooling is important.

Accurate control of temperature and humidity by Powers in this completely air-conditioned plant helps employees THINK better and produce better quality products. Central Fan Systems supply proper year 'round conditioned air for the varied types of activity in these spaces: engineering, manufacturing, test areas, laboratories, offices, classrooms and cafeteria. Perimeter areas of the building are heated with silline hot water radiation regulated by Powers master-sub-master control systems.

Powers Process Controls also are used at IBM for accurate temperature control of dryers, metal plating and finishing, photo film developing, heat treating, and shower baths.

Are You Planning a New Building or modernizing an old one? Solving the many temperature, humidity and pressure control problems at IBM exemplifies the engineering skill available at Powers and the versatility of Powers Control to handle a wide range of requirements. Ask your architect or engineer to include a Powers Quality System of Temperature and Humidity control.

POWERS CONTROL

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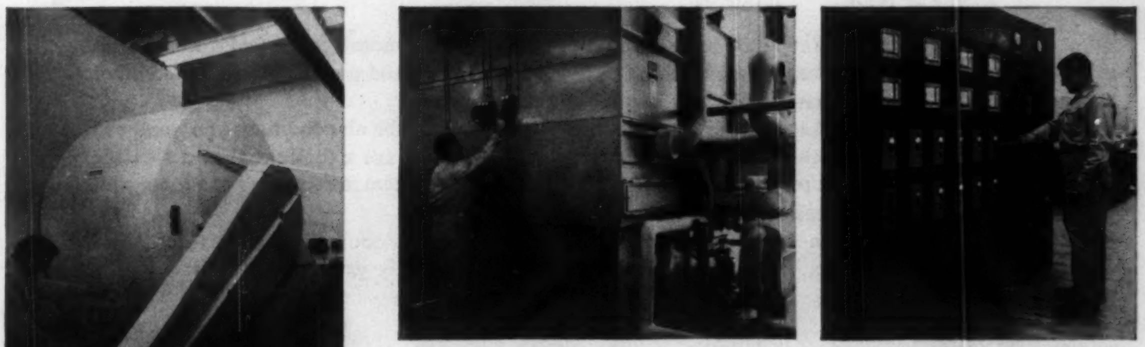
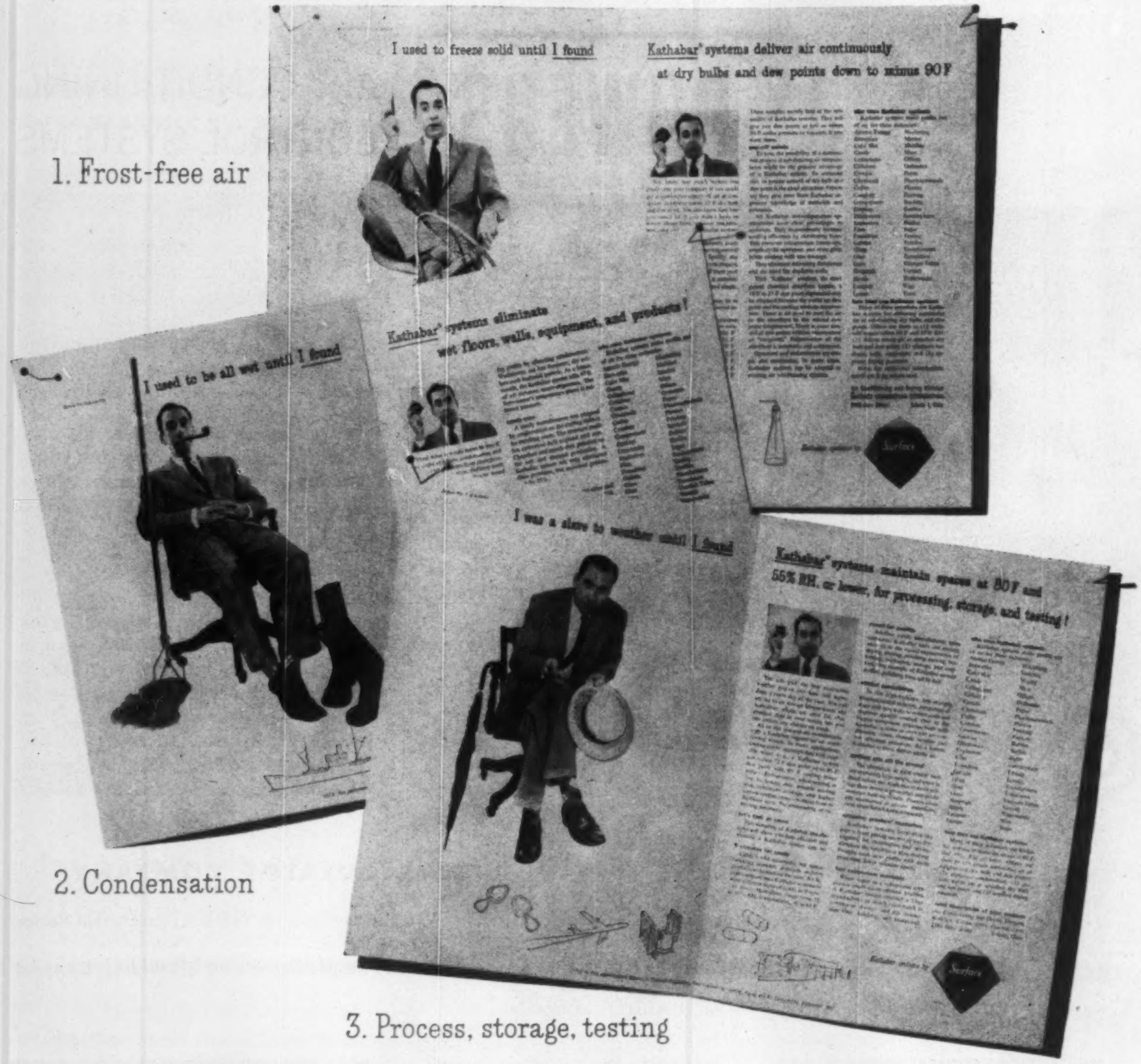
65 Years of Automatic Temperature and Humidity Control



In 4 special SAGE Computer test areas are dehumidifiers (above), a central control panel (right), and dry air coolers (left). On the latter, fluid drive variable speed control is operated by a 6" Powerstroke motor controlled by Powers Static Pressure Regulator and Submaster K Thermostat.

(C-57)

Only Kathabar® systems provide



I used to freeze solid until I found

Kathabar® systems deliver air continuously at dry bulbs and dew points down to minus 90 F

I used to be all wet until I found

Kathabar® systems eliminate wet floors, walls, equipment, and products!

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1. Frost-free air

2. Condensation

3. Process, storage, testing

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any humidity condition...

for your process and comfort

"I've found continuous pure air"
Kathabar systems kill over 97% of micro-organisms in large volumes of air!"
"I got rid of that cold sweat"
Kathabar systems control all air dimensions... temperature, humidity and purity"
Surface

4. Pure air

5. Shock-free comfort

Reply slip

Air Conditioning & Drying Division, Surface Combustion Corporation, 2384 Dorr St., Toledo 1, Ohio

Gentlemen: I would like more detailed information on the specific fields of application checked below:

( ) 1. Frost-free air ( ) 2. Condensation ( ) 3. Process, storage, testing
( ) 4. Pure air ( ) 5. Shock-free comfort ( ) Low temperature drying

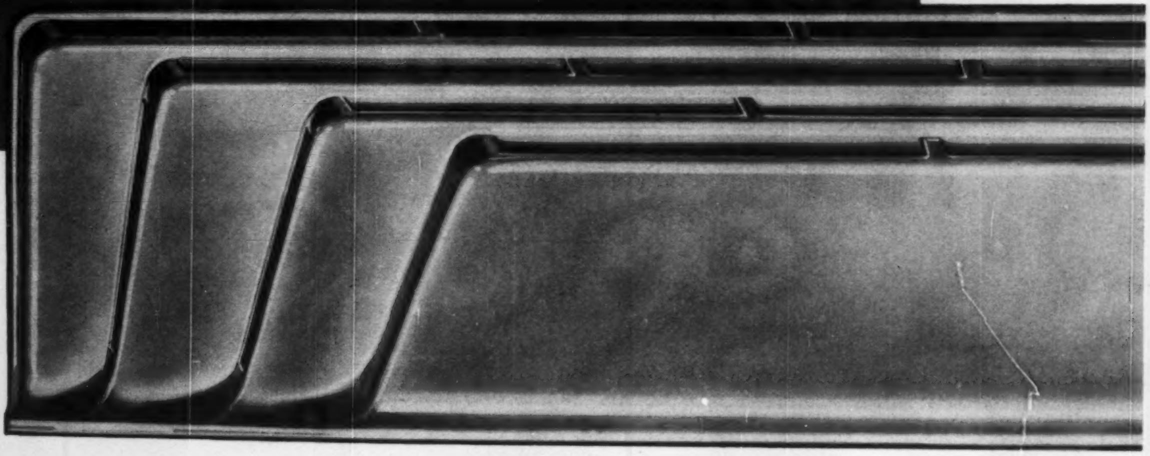
Name ______ Title ______
Company ______ Company product ______
Company address ______
City ______ Zone ______ State ______

Surface

New by TITUS

THE

NEW MODEL P-125



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Because it's FULLY ADJUSTABLE . . . the new Titus MODEL P-125 diffuser provides the proper throw and spread for obtaining maximum diffusion efficiency in BOTH HEATING AND COOLING. *It's today's first diffuser so advanced in design it can deliver THE NECESSARY AIR PATTERNS TO ASSURE MAXIMUM PERFORMANCE FROM MODERN AIR CONDITIONING SYSTEMS.*

Years ahead in looks, too! New distinctive, swept-line styling blends beautifully with any surroundings. Built rugged . . . for lasting comfort and satisfaction. *A REAL MONEY SAVER* . . . because it's easier, quicker to install . . . eliminates call-backs.

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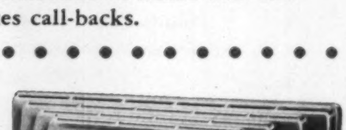
ALSO AVAILABLE IN NEW ECONOMY MODEL P-75



The same superb styling . . . the same basic ADVANCED design as Titus Model P-125 except does not have dual adjustable feature. *Handles cool or warm air with equal efficiency.* Keeps uniform temperatures throughout the room . . . eliminates low level stratification.

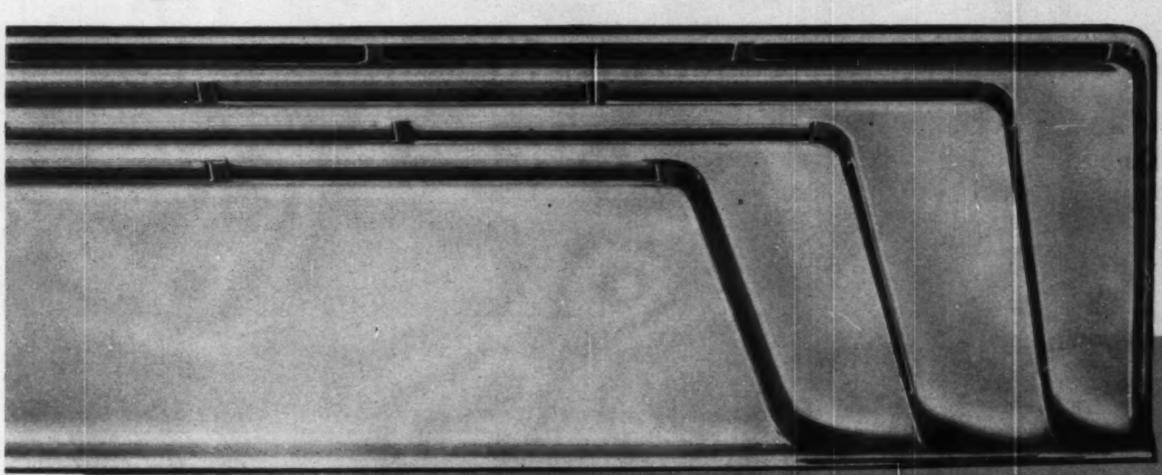
THE NEW MODEL P-75 DIFFUSERS CAN GIVE YOU THE CONTRACT AGAINST ALL KINDS OF PRICE CUT BIDDING BECAUSE THEY CAN HANDLE MORE AIR PER UNIT COST. They look better, are constructed better and absolutely outperform competition. WRITE FOR DETAILS.

INDUSTRY'S FIRST

ADJUSTABLE FOR HEATING

ADJUSTABLE FOR COOLING

perimeter diffuser



New! **FINGERTIP ADJUSTMENT** for heating or cooling. Simply push control to desired setting.

New! **SWEPT-LINE STYLING.** Lower, narrower, more streamlined silhouette. Today's most beautiful diffuser.

New! **ADJUSTABLE BASE** for easier, cheaper installation. Allows complete flexibility of boot location.

New! **BUILT-IN DAMPER** . . . handy, fingertip volume control from side of diffuser. Damper adjusts from full open to full closed within diffuser. Balancing stops.

New! **BIG FREE AREA** . . . greater than any other diffuser of comparable size. Capacity to spare for BOTH HEATING AND COOLING.

. . . **NEW, FREE CATALOG**

MAIL COUPON TODAY

TITUS MFG. CORP., WATERLOO, IOWA

☐ Rush me FREE CATALOG with complete details on the NEW TITUS "Adjustable-for-heating, Adjustable-for-cooling" PERIMETER DIFFUSERS.

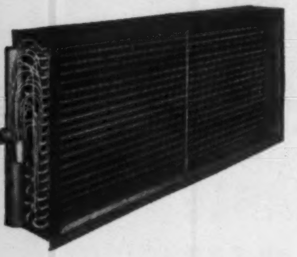
☐ Send name of nearest jobber.

NAME ____________________

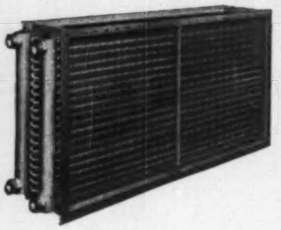
COMPANY ____________________

ADDRESS ____________________

CITY ____________ STATE ____________

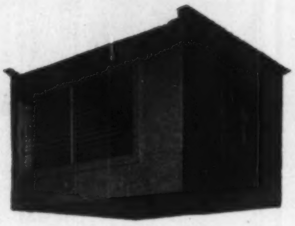


McQuay Direct Expansion coils have the exclusive Ripple-Fin and staggered tube construction for maximum heat transfer, strength and rigidity. Made in an exceptionally wide variety of sizes, styles and capacities to meet the requirements of every application.



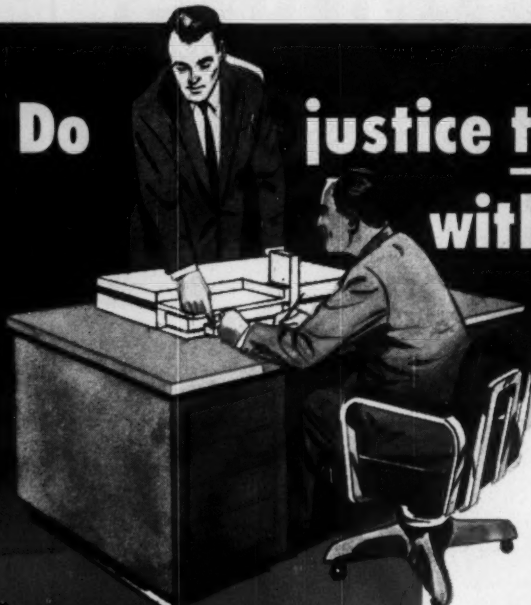
McQuay Water Cooling coils are available in a wide variety of sizes, styles and capacities, 1 to 10 rows. Staggered tubes and rippled fins create air turbulence to give maximum air side heat transfer. Mechanical expansion bond insures permanent metal to metal construction.

Floor Type Seasonmaker for free standing floor mounting. 4 sizes, 200 cfm to 600 cfm, ½ to 2 ton nominal cooling capacity. Thermally and acoustically insulated. Choice of 3 air discharge grilles. Basic type for fully recessed applications is also available.



Ceiling Type Seasonmaker. For suspended mounting. Seven sizes from 200 cfm to 2000 cfm, ½ to 5 ton nominal capacity. Thermally and acoustically insulated. Designed for multi-room buildings. All units have the famous McQuay Ripple-Fin coils.

Do justice to air conditioning with these true-rated



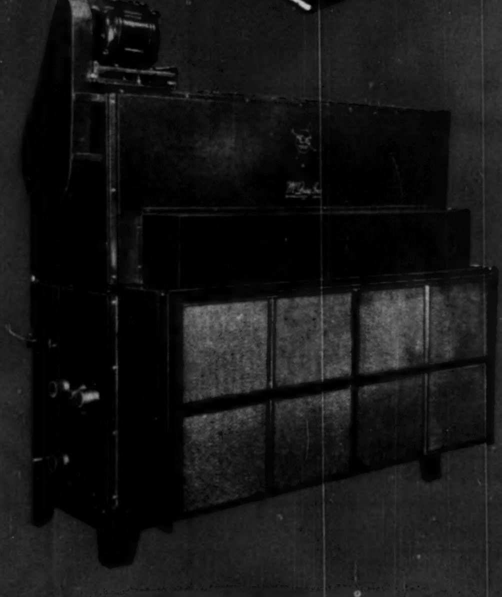
When you use McQuay coils or air conditioning units, you can be sure your air conditioning, heating or cooling system, will perform at its very best—that it will deliver its true-rated capacity and produce the results for which it was designed.

There is no substitute for quality—no substitute for experience. McQuay gives you both, backed by the research for which McQuay is famous.

To do true justice to air conditioning, use true-rated McQuay coils and units. There is a coil and a unit especially designed for every conceivable purpose, a size for every need. And thousands of McQuay installations are constant proof of McQuay know-how.

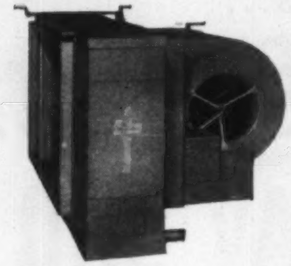
There is a McQuay representative in or near your city, or write McQuay, Inc., 1601 Broadway Street N.E., Minneapolis 13, Minnesota.

McQuay
Means Quality



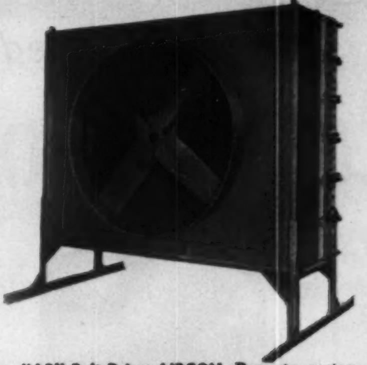
Vertical Seasonmaster Central Station Air Conditioner. Available with cooling coil, heating coil, face, and by-pass, mixing box and filter section. Framework fabricated of heavy gauge continuous coated galvanized steel. All coils are made with exclusive McQuay Ripple-Fin construction for maximum heat transfer. Sixteen sizes from 640 cfm to 29000 cfm.

Horizontal Seasonmaster Central Station Air Conditioner. Seasons are all temperate when you provide complete air conditioning with Seasonmaster. Available with cooling coil, heating coil, face and by-pass, mixing box, and filter section. Sixteen models from 640 cfm to 29000 cfm with maximum flexibility in location of coil connections and air openings.



Hideaway Type Seasonmaker. For concealed suspended mounting. Seven sizes from 200 cfm to 2000 cfm, ½ to 5 ton nominal capacity. Will furnish individual room comfort at any desired temperature, —heated, filtered air in the winter; cooled, dehumidified and filtered air in the summer.

"AR" Residential AIRCON. Remote type air cooled condenser designed for extra quiet operation as required in residential applications. It will operate efficiently with R-12 or R-22 compressors without the use of water. Available in 2, 3, 5, and 7½ ton nominal capacities.



"AB" Belt Drive AIRCON. Remote, waterless condenser available in eight sizes—9, 11, 15, 20, 25, 30, 40 and 50 ton nominal capacities in individual units. Lifetime ball bearing and slow speed propeller type fan. Type "AD" Aircons are also available in 2, 3, and 5 ton nominal capacities.

McQuay coils and units

"RH" Air Conditioner. Water and direct expansion models in four sizes from 1000 cfm to 3000 cfm. Heating coils for use with steam or hot water and cooling coils for use with water or Freon available to provide year 'round operation. Can be installed in an adjacent area if needed.

Horizontal Multi-Zone Air Conditioning Unit. Outside weather conditions, or inside requirements may make it necessary to heat some sections of a building at the same time that other sections require cooling. Ten sizes from 1370 cfm to 29000 cfm. Available with 6 to 22 zones.

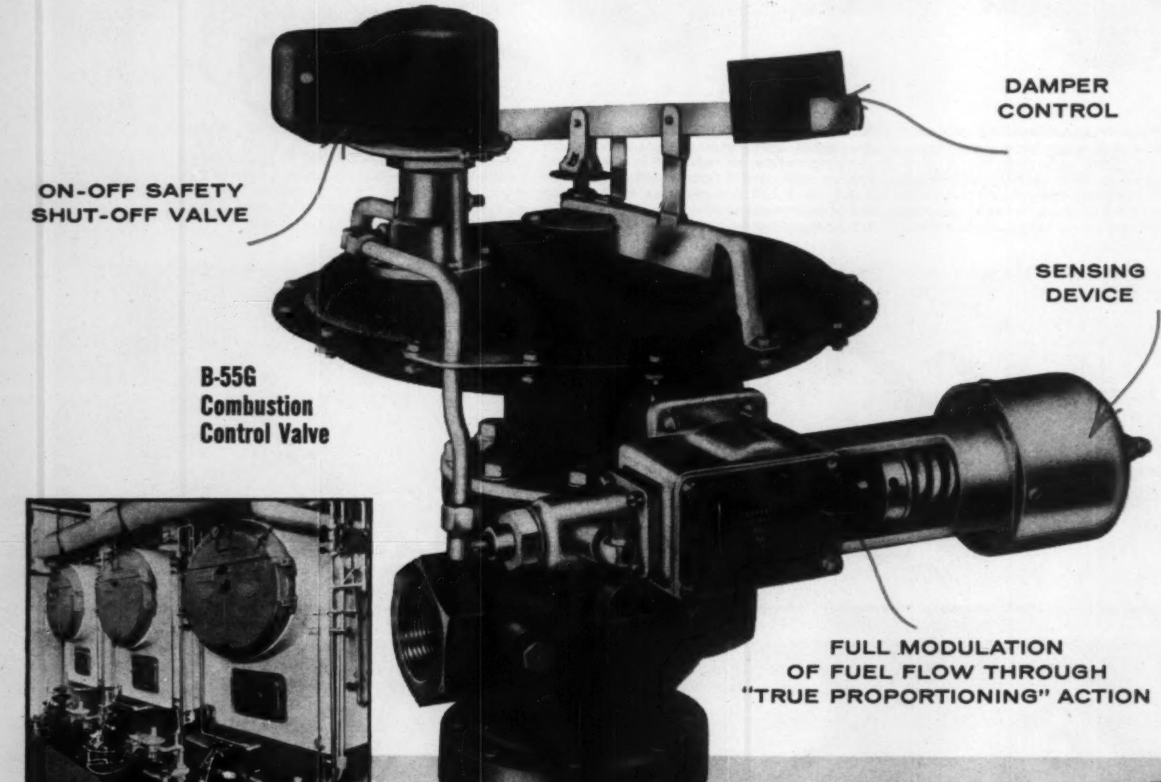
Vertical Multi-Zone Air Conditioning Unit. Specifically designed for simultaneous heating and cooling. Eight sizes from 1370 cfm to 21000 cfm. This unit is so constructed that it can deliver to any one of many different zones in a building, either cooled, filtered dehumidified air, or heated, filtered and humidified air, or a mixture.

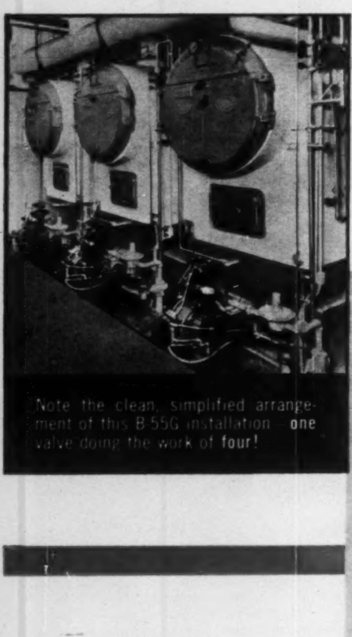
McQuay INC.

AIR CONDITIONING
HEATING
REFRIGERATION

For Gas-Fired Boilers and Furnaces...

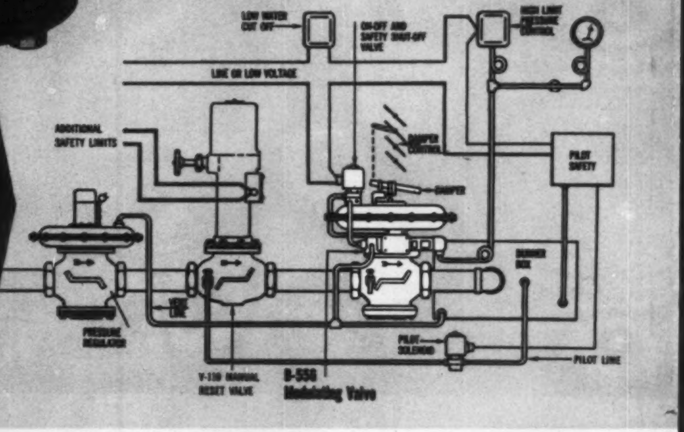
A Combustion Control System...


DAMPER CONTROL
ON-OFF SAFETY SHUT-OFF VALVE
SENSING DEVICE
B-55G Combustion Control Valve
FULL MODULATION OF FUEL FLOW THROUGH "TRUE PROPORTIONING" ACTION



Note the clean, simplified arrangement of this B-55G installation — one valve doing the work of four!

Here's all you need for a complete Control System


LOW WATER CUT OFF
ON-OFF AND SAFETY SHUT-OFF VALVE
HIGH LIMIT PRESSURE CONTROL
LINE OR LOW VOLTAGE
ADDITIONAL SAFETY LIMITS
DAMPER CONTROL
DAMPER
PILOT SAFETY
BURNER BOX
VENT LINE
PRESSURE REGULATOR
PILOT SOLENOID
PILOT LINE
V-130 MANUAL RESET VALVE
B-55G Modulating Valve

GENERAL CONTROLS

America's Finest Automatic Controls for Home, Industry, and the Military

Glendale, California • Skokie, Illinois • Guelph, Ontario, Canada

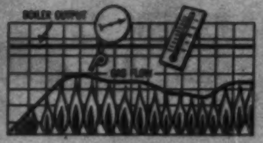
Six Plants—42 factory branch offices serving the United States and Canada

... all in
ONE VALVE!

1. **Fuel Proportioning**
2. **Pressure or Temperature Sensing**
3. **Damper Control**
4. **Additional Safety Shut-Off**

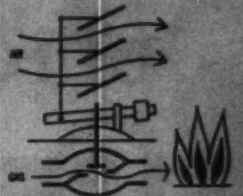
Responsive to steam... hot water... warm air... *ANY* commercial and industrial gas-fired equipment, *THIS single* valve can mean a world of difference in efficiency, safety and PROFITS. The B-55G is the only valve of its kind in existence and if you haven't had the opportunity to check out all its money-saving superiority, you've been missing a great advance in control systems! B-55G is available in sizes 1" ips to 6" flange, fully approved by AGA, FM and UL. Pressure and temperature ranges to 600 psi and 700°F. Send today for full information.

CONTROL



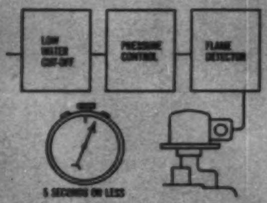
Full modulation provides steady boiler pressure (or furnace temperature) in response to changes in load. Variable speed of response eliminates "hunting" action. Valve moves slowly for slight changes, more rapidly for greater changes.

EFFICIENCY



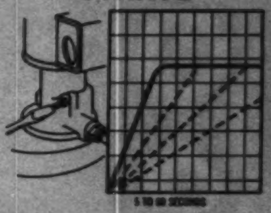
Proper fuel/air mixture is maintained throughout full throttling range of the valve. This means efficient, fuel-saving combustion for ALL firing conditions.

SAFETY



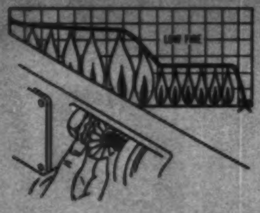
Quick-closing safety shut-off responds readily to high limit controls. Magnetic pilot valve overrides proportioning action—provides fast, positive shut-down.

DEPENDABLE STARTS



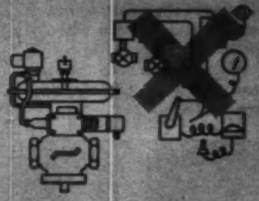
Opening speed is adjustable for best possible ignition and pick-up. You get safe, sure starts without roll-out explosions!

NO PUFF-BACK



Low-Fire position is adjustable for boiler "idling" at safe minimum flame. Quick closing action prevents flame flutter and dangerous puff-backs.

LOW COST



B-55G is ONE valve—replacing FOUR! It's easier to install, reduces maintenance time and costs, simple to operate and costs FAR LESS as original equipment!

Send today for complete information

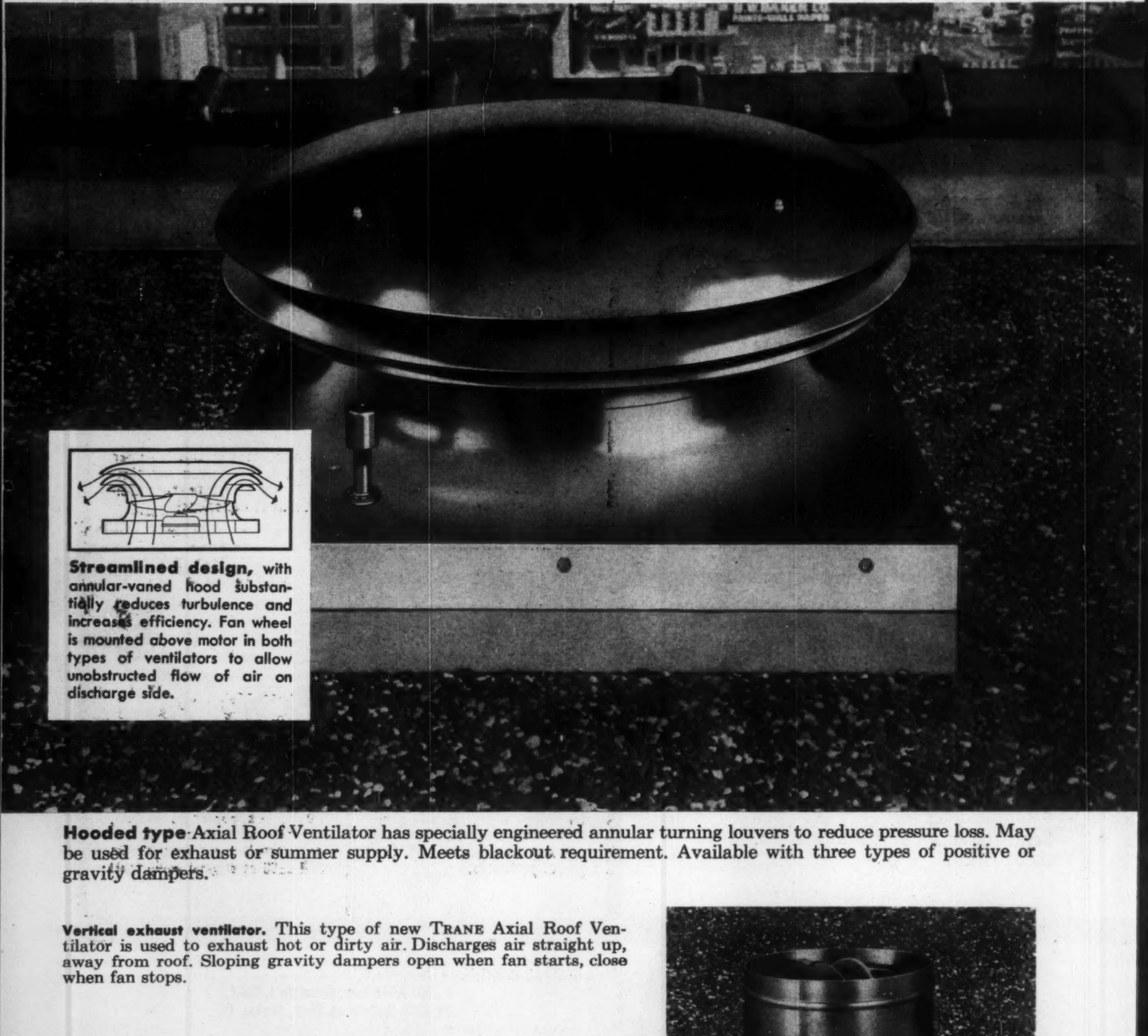
GENERAL CONTROLS • Dept. 300-V
801 Allen Ave., Glendale 1, Calif.
OR 8080 McCormick Blvd., Skokie, Ill.

I want more information on B-55G Combustion Control Valves:

☐ Descriptive Instruction Sheet
☐ Ordering Catalog
☐ Please have a qualified representative call

NAME ____________________
TITLE ____________________
COMPANY ____________________
STREET ____________________
CITY ______________ STATE ______

Now! Low cost the Trane Axial

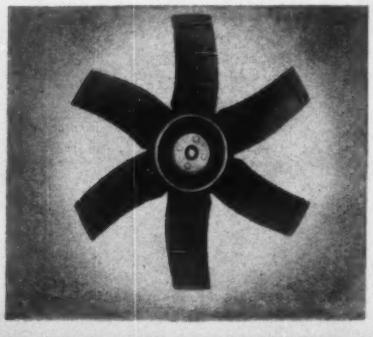


Streamlined design, with annular-vaned hood substantially reduces turbulence and increases efficiency. Fan wheel is mounted above motor in both types of ventilators to allow unobstructed flow of air on discharge side.

Hooded type Axial Roof Ventilator has specially engineered annular turning louvers to reduce pressure loss. May be used for exhaust or summer supply. Meets blackout requirement. Available with three types of positive or gravity dampers.

Vertical exhaust ventilator. This type of new TRANE Axial Roof Ventilator is used to exhaust hot or dirty air. Discharges air straight up, away from roof. Sloping gravity dampers open when fan starts, close when fan stops.

Model B fans—3 or 6 bladed—are furnished with TRANE Axial Roof Ventilators. Fan blades are arc-welded to the spun fan hubs. Stiffeners spot-welded to blades for added reinforcement.



ventilation with Roof Ventilator

New from Trane . . . a low silhouette, high efficiency ventilator that's completely accessible from the roof!

Here's a roof ventilator that will provide economical ventilation for mills, factories, warehouses and all large buildings with open type interiors. It's the new TRANE Axial Roof Ventilator—designed to provide lower silhouette, lower initial cost, low power consumption, complete accessibility from the roof.

Available in two basic types—hooded or vertical exhaust—the new TRANE Axial Roof Ventilators come in five sizes: 24, 30, 36, 42 and 48-inch fan wheel diameter. Models are available to handle corrosive and explosive fumes and gases.

Easy to maintain, these ventilators have easily accessible motors and drive belts; complete assembly pivots for fast service or inspection.

Next time you're planning a factory or commercial ventilation job, make it TRANE! For complete facts, just call your nearby TRANE Sales Office or write TRANE, La Crosse, Wisconsin.

Check these features!

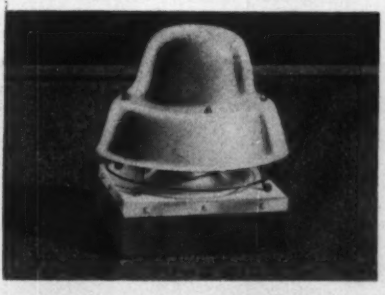
- *AMCA Certified Rating Seal*—Units tested and rated according to the Standard Code of the Air Moving and Conditioning Association (AMCA) and the ASHAE.
- *Low silhouette*—For trim appearance. 24-inch ventilator is only 19$\frac{3}{16}$" above roof line.
- *Easy maintenance*—Hood slips off easily for access to motor and belts. Complete assembly pivots. Safety switch on unit permits maintenance man to disconnect fan for service.
- *Quality construction*—All wheels are scientifically balanced. Blades are blanked and die-formed complete with beads to insure permanent set of blade contour. For added reinforcement, stiffening plates are spot-welded to each blade. Motors are totally enclosed.
- *Versatile*—Complete range of five sizes from 24-inch to 48-inch wheel diameter. Two basic types: vertical exhaust, and hooded exhaust or supply. Models available to handle corrosive and explosive fumes and gases.
- *Safe*—Units are available with built-in spring and fusible link to control damper in presence of fire.

For __any__ air condition, turn to

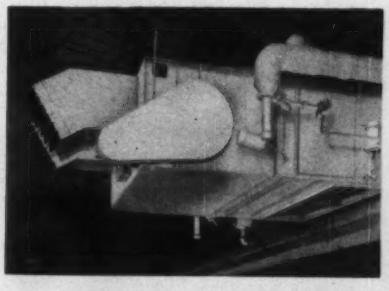
TRANE

MANUFACTURING ENGINEERS OF AIR
CONDITIONING, HEATING, VENTILATING
AND HEAT TRANSFER EQUIPMENT

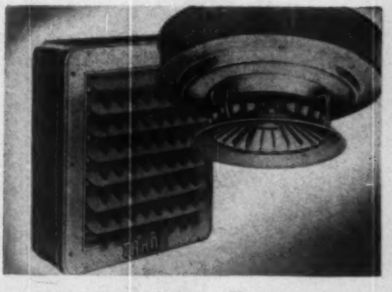
THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA.
TRANE COMPANY OF CANADA, LTD., TORONTO • 96 U.S. AND 19 CANADIAN OFFICES



Centrifugal Roof Ventilator for quiet, high-volume ventilation against higher static pressures. Streamlined, lightweight, compact, easy to install. 16 fan sizes from 7" to 40" wheel.



TRANE Torrivent heats and ventilates large areas. Rugged, efficient centrifugal units handle up to 33,000 cfm. May be installed on floor, ceiling or wall, with or without duct work.



TRANE Unit Heaters—Horizontal or Projection types—put the heat where you want it! Patented diffusion feature gives an unlimited number of heating patterns.

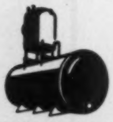
ELLIOTT PRODUCTS

TURBINE-GENERATORS

TURBINES

MOTORS

GENERATORS

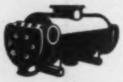


DEAERATING HEATERS

Two Elliott C-W 30-hp increment-start motors drive the compressors which serve a single flooded-water chilling unit in the Westmoreland Congregational Church, Washington, D. C.

ELLIOTT Crocker-Wheeler motors bring COOLING COMFORT to the Nation's Capital

EJECTORS



CONDENSERS

COMPRESSORS

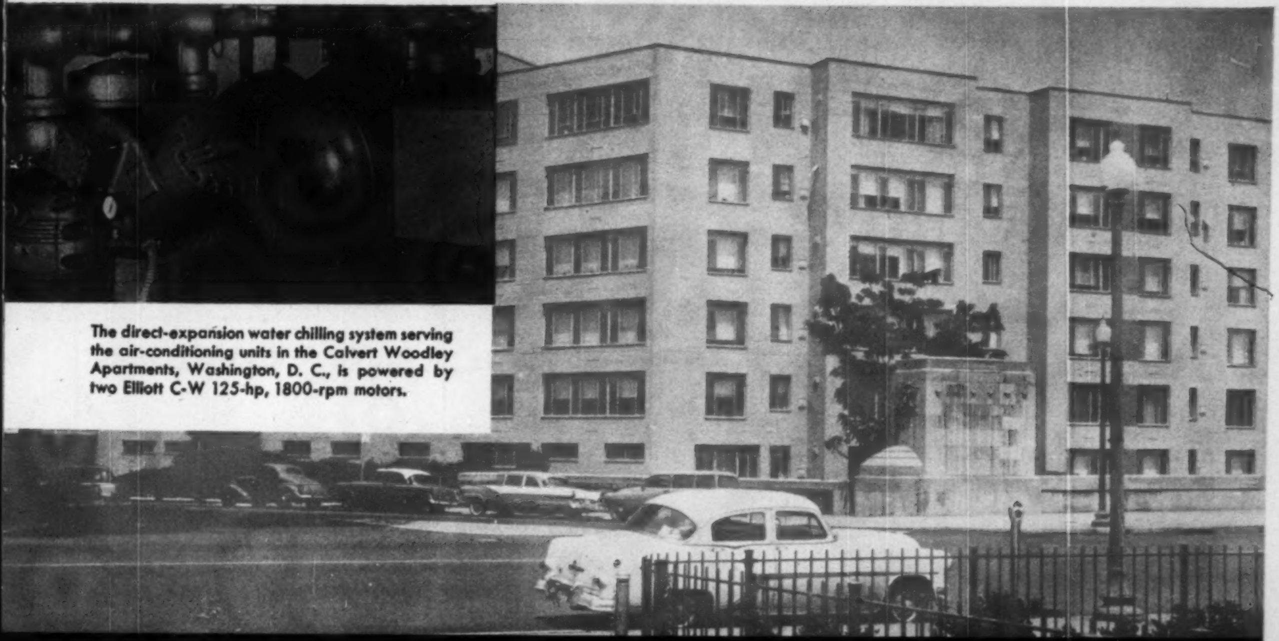
TURBOCHARGERS

TUBE CLEANERS

STRAINERS

W7-2

Two Elliott C-W 50-hp increment-start motors drive compressors serving a direct expansion air-conditioning system in the penthouse, J. C. Penney Company, Alexandria, Va.; there is also a 60-hp unit in the basement.



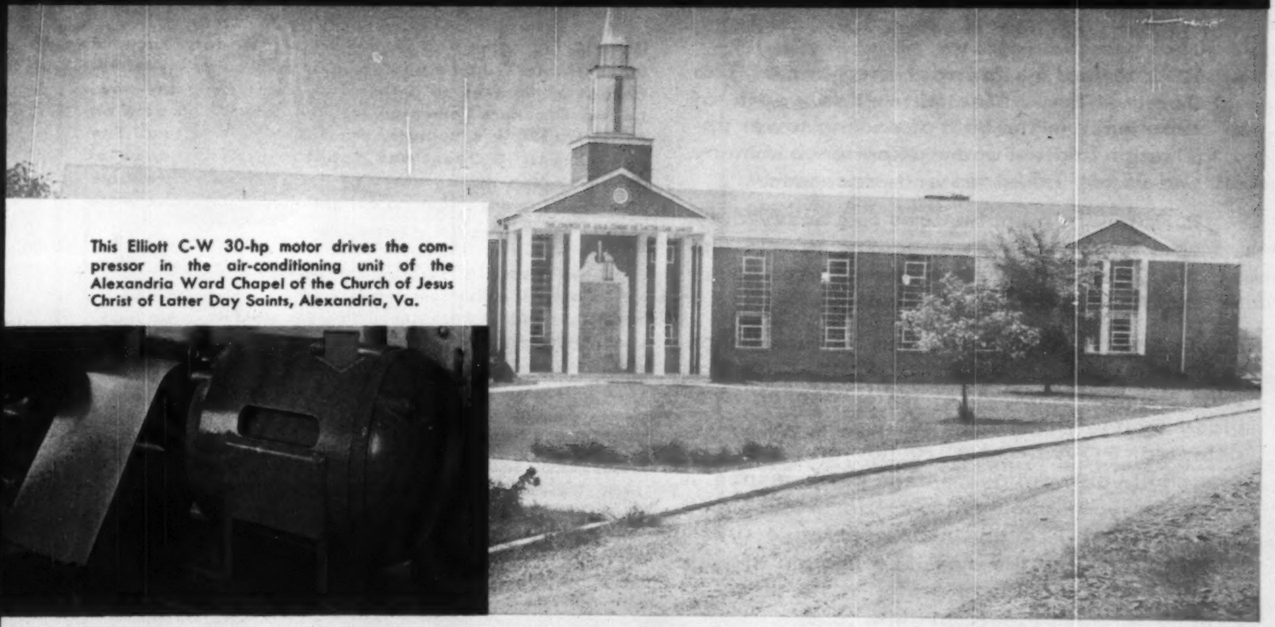
The direct-expansion water chilling system serving the air-conditioning units in the Calvert Woodley Apartments, Washington, D. C., is powered by two Elliott C-W 125-hp, 1800-rpm motors.

These Elliott C-W motors serving Carrier air-conditioning units in or near Washington, D.C., are only a few examples of what is happening in cities all over the country. Because of their superior performance and long-term dependability, the popular Elliott C-W motors are repeatedly selected to drive compressors, pumps, and other auxiliary equipment.

* * *

For details, contact your nearby Elliott district office, or write Elliott Company, Crocker-Wheeler Division, Jeannette, Pa.

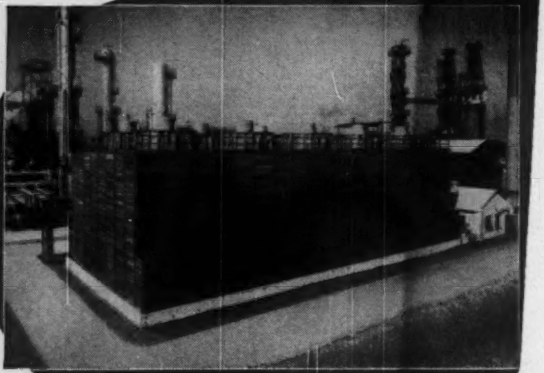
ELLIOTT Company



This Elliott C-W 30-hp motor drives the compressor in the air-conditioning unit of the Alexandria Ward Chapel of the Church of Jesus Christ of Latter Day Saints, Alexandria, Va.

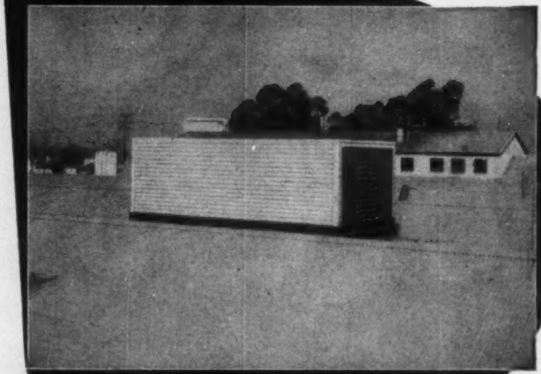
PRITCHARD CAN SOLVE YOUR COOLING TOWER PROBLEMS

WITH
Pritchard
HEAVY-DUTY COOLING TOWERS



(COUNTERFLOW) ↓↑

WITH
Pritchard
LoLine®
COOLING TOWERS



→↓ (CROSSFLOW)

What are Pritchard's qualifications for assisting you in selecting the cooling tower best for your specific needs? They are twofold:

1. Pritchard—a founder member of The Cooling Tower Institute—has years of experience in the field of cooling tower application to draw upon—experience in many and varied industries and processes.
2. Pritchard manufactures *both* heavy-duty, counterflow industrial cooling towers and the smaller LoLine crossflow tower for air conditioning or industrial service.

Whichever your need, you can be sure of one thing—you get more from Pritchard! For example, the economical water cooling provided by the Pritchard LoLine; the exclusive, patented POWairSAVER fan on industrial models. If you want guaranteed performance... more for your cooling tower dollar... consult your nearest Pritchard representative (you'll find him listed in the classified section of your phone book). Or if you prefer, write direct to Pritchard for more information.

SEND FOR TWO FREE BROCHURES

It costs you nothing to get the whole story on Pritchard cooling towers. Just a note to us on your company letterhead is all it takes to get your free copies of the new, LoLine Brochure (gives you all the details and data on Pritchard's low silhouette, crossflow towers) and "The Answers to 15 Questions About Pritchard Industrial Towers" (the inside story of Pritchard Counterflow towers). You are under no obligation, of course, so write today!

INDUSTRY'S PARTNER FOR PROGRESS

COOLING TOWERS
GAS & AIR TREATING EQUIPMENT

REPRESENTATIVES
IN PRINCIPAL CITIES
FROM COAST
TO COAST

J.F. Pritchard & Co.
OF CALIFORNIA
A DIVISION OF J. F. PRITCHARD & CO
Dept. 587 4625 Roanoke Parkway, Kansas City 12, Mo.

World's First Nuclear-Powered Surface Ship will have MIDWEST Welding Elbows

U. S. Navy's guided missile, nuclear-powered cruiser "Long Beach"

OFFICIAL U. S. NAVY PHOTOGRAPH

Special Fittings are "ROUTINE" for Midwest

Stainless Steel
S.R. 102° Elbow
with tangent on one end.

Stainless Clad
S.R. 39° Elbow
with tangent on one end.

Stainless Steel
S.R. 90° Elbow
with tangent on both ends.

Special Elbows (dimensions, tangents, wall thicknesses and materials) are easily provided by the exclusive and flexible Midwest method. Elbows are available in any material that can be secured as plate, which also means better delivery. Closer tolerances are inherent in the Midwest process. Quality control always exceeds Code requirements.

Shown here are three of the special stainless steel and stainless-clad elbows made by Midwest for the "U.S.S. Long Beach". All reactor coolant piping must meet extremely rigid specifications because of the difficult service. Special quality controls, such as ultrasonic testing, intergranular corrosion tests, dye checking, radiography, and ring flattening tests were used one or more times at various stages of manufacture from the raw material to the finished fittings. Special quality standards for soundness of metal, "water clear" welds, dimensional accuracy, and surface finish were satisfied.

The U. S. Navy's first nuclear-powered surface ship, the "Long Beach", will introduce a radically new concept in defense capabilities. She will operate offensively and independently of other forces under conditions of both nuclear and non-nuclear warfare against airborne, surface or under-sea opposition. In addition to equipment and weapons for detecting and destroying enemy submarines, she will carry the Navy's modern guided missiles.

The piping for the atomic reactors being designed and developed by the Westinghouse Electric Corporation will use a large number of special heavy wall stainless steel Midwest Welding Elbows. This is not the first atomic project for which Midwest Welding Fittings have been used. In fact, when the nuclear propulsion program first began, Midwest furnished special welding fittings for the "Nautilus" prototype installation at Arco, Idaho.

Whether or not you are concerned with nuclear power, Midwest Welding Fittings (both stock and specials) will do a better job for you. Ask your Midwest distributor or write us for Catalog 54, which tells you why.

MIDWEST PIPING COMPANY, INC.

Main Office: St. Louis 3, Missouri (P.O. Box 433)

Plants: St. Louis, Clifton, N. J. and Los Angeles

SALES OFFICES: ASHEVILLE (BOX 446, SKYLAND, N.C.) • BOSTON 27—426 FIRST ST.
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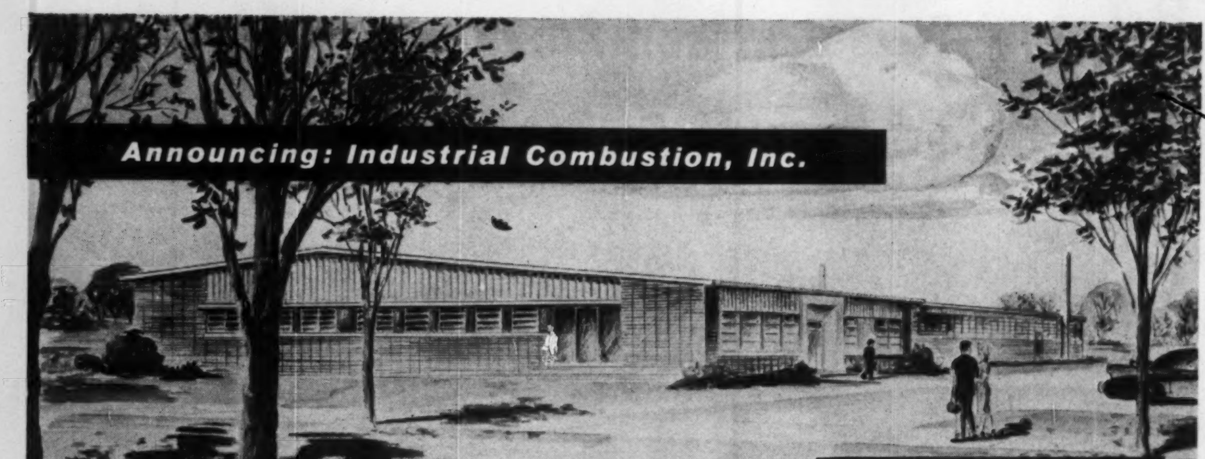
STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

7918

MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS



Announcing: Industrial Combustion, Inc.

"A new company born to meet the challenge of an expanding market"

***by* J. VERNE RESEK**

OUR organization is birthday-young but our products are time-proven in the field. We're starting life with the patents and facilities of the Hev-E-Oil burners and Hev-E-Duty gas burners . . . we're starting with a background of 18 years of continuing improvement. A good beginning, true — but we plan to expand our product line to include new and technically advanced equipment related to our widely accepted commercial-industrial oil and gas burners.

That's why we are constructing a new plant with complete burner research and development facilities. The most modern equipment . . . advanced manufacturing techniques . . . unexcelled engineering and research talent will all contribute to achievement of our goal: production of the finest commercial-industrial burners and other combustion products in our industry.

As Hev-E-Duty gas and Hev-E-Oil burners have led the field in the past, Industrial Combustion, Inc. will continue . . . building burners and introducing developments so modern, they will be new and unequalled for years to come.

We of Industrial Combustion, Inc. are proud to announce our arrival and will strive to be of service to you wherever and whenever we can.

J. VERNE RESEK, president of Industrial Combustion, Inc., was formerly manager of the Burner Division of Cleaver-Brooks.

Other experienced executives of Industrial Combustion, Inc., are: Howard McCoy, vice-president in charge of engineering; Robert Harland, secretary; and William J. DeMuth, sales manager.

Industrial Combustion, Inc.

Plant: Monroe, Wisconsin

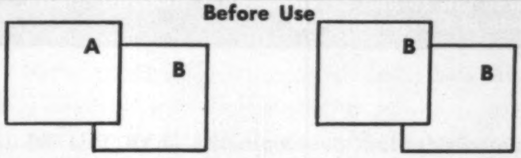
Executive Offices: 4507 N. Oakland Avenue, Milwaukee, Wisconsin

Tomorrow's combustion products today

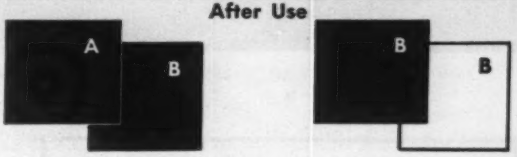
air, smoke, gas, filtration problems?

Find out how remarkable, new, 100% nylon NY-SUL-LOFT* turned one firm's problems into profits!

Seeking an answer to rising maintenance and filter replacement costs, a large industrial and office building air conditioning service company conducted the following impartial, on-the-job test:



1 Two filter media were placed in operating position, under identical operating conditions. One was an ordinary, widely-used material, (A). The other was new Ny-Sul-Loft, (B). Behind each was placed a second Ny-Sul-Loft filter.



2 After the usual interval between replacements the outer filters were removed. The piece of Ny-Sul-Loft behind the ordinary filter was black. The one behind the Ny-Sul-Loft was still clean and white!

Saves Time and Money

Ny-Sul-Loft *proved* itself superior to the best filtering material this company had found. It proved that by reducing the frequency of service calls it could place the company in a better competitive position — a position where it could serve more customers, *more profitably!*

If you are a filter manufacturer, a manufacturer of air conditioning or air purification equipment — or a design engineer working in these fields — Ny-Sul-Loft can solve *your* problems in cooling, heating or purifying air. Send for samples and test them NOW!

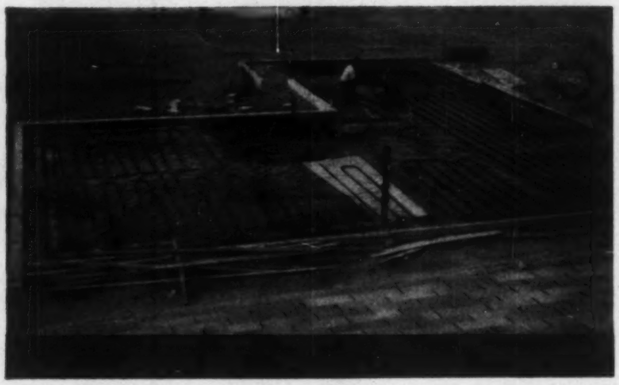
*Pat. applied for

STAR WOOLEN COMPANY
Dept. A Cohoes, N.Y.

Ny-Sul-Loft is a 100% nylon material, its fibers permanently welded into minute, resilient "springs." It is resistant to a wide range of alkalis, acids and other chemicals which do not react with nylon. Available in standard formulation or engineered for your specific requirements.

STAR WOOLEN CO., Dept. A Cohoes, N. Y.
Send samples and specifications of Ny-Sul-Loft immediately to:

NAME ....
TITLE ....
COMPANY ....
ADDRESS ....
CITY .... STATE ....



Youngstown steel pipe

. . . Gives Long, Maintenance-Free Life to Radiant Heating Installations

Youngstown Steel Pipe was installed by National Heating Co. in this 60-unit development of Modern Builders, Inc., both of Cincinnati, Ohio.

Specify Youngstown and secure these 7 Points of uniform goodness

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness

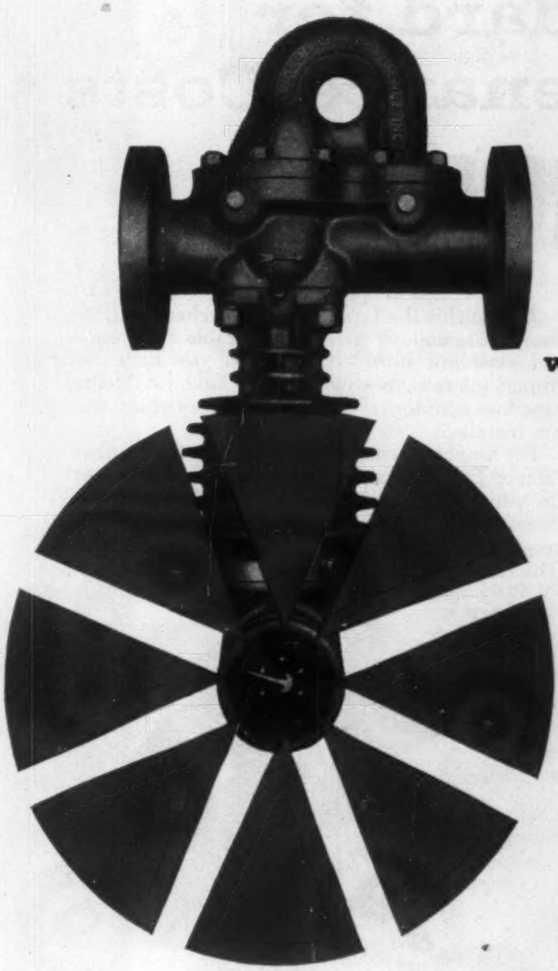
Modern residential developments—like this 60-unit project off Cincinnati's Winton Road—demand only the most modern heating facilities. So, to afford these new homeowners warm, draft-free rooms of equalized temperatures, invisible radiant heating systems utilizing Youngstown Steel Pipe were installed.

For years Youngstown Steel Pipe has been specified by leading architects as well as progressive plumbing and heating contractors for its dependability and long life. That's because it's made of only the finest steel by steelmen with over half-a-century of steelmaking knowhow. All Youngstown operations from ore mining to finish threading are closely quality-controlled to give you the best piece of pipe obtainable anywhere. Why not make Youngstown your specification for long, trouble-free installations?

For additional information or service, contact your local Youngstown distributor—or phone our nearest District Sales Office, today.

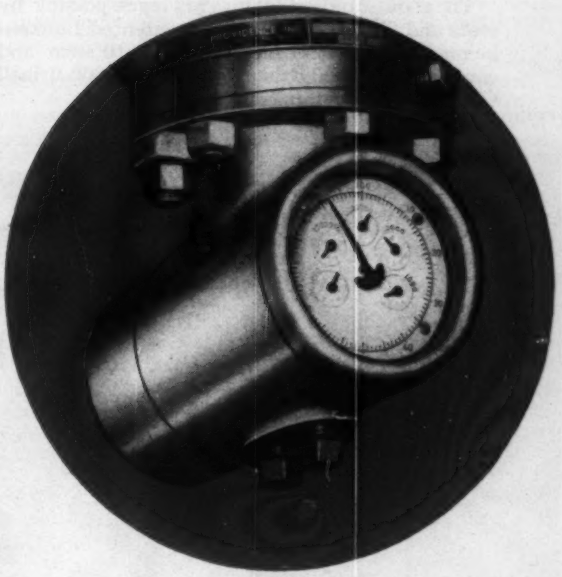
QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities



NOW! STOP STEAM GIVE-AWAY

with this Pressure-Compensated Counter
. . . for users of Builders-Providence
Shuntflo® Steam Meters



NEW UNIT adapts Shuntflo to applications having wide pressure fluctuations

METER READING is automatically and continuously corrected for line pressure variations

SELF-OPERATED, self-contained counter unit — no external power source required

EASILY INSTALLED on all models of the service-proven Shuntflo

PROVIDES closer accounting of steam consumption by area, building, or process.

INVESTIGATE this **PRESSURE COMPENSATED COUNTER** which comes as a "complete package" . . . ready to start adding up *steam savings* for you!

A NEW STAR in steam metering, this unit offers a wide range of correction . . . in either direction (above or below) or both directions from normal pressure. It is also available with contacts for electrical operation of remote totalizers, demand meters, and recorders.

FREE BULLETIN shows how easy it is to install this unit and to change steam losses to profits. Request your copy of Bulletin 400-P1 today! Write Builders-Providence, Inc., 381 Harris Ave., Providence 1, R. I.

BUILDERS-PROVIDENCE
DIVISION OF
B-I-F INDUSTRIES
METERS FEEDERS CONTROLS

Industry Standard for Lower Maintenance Costs

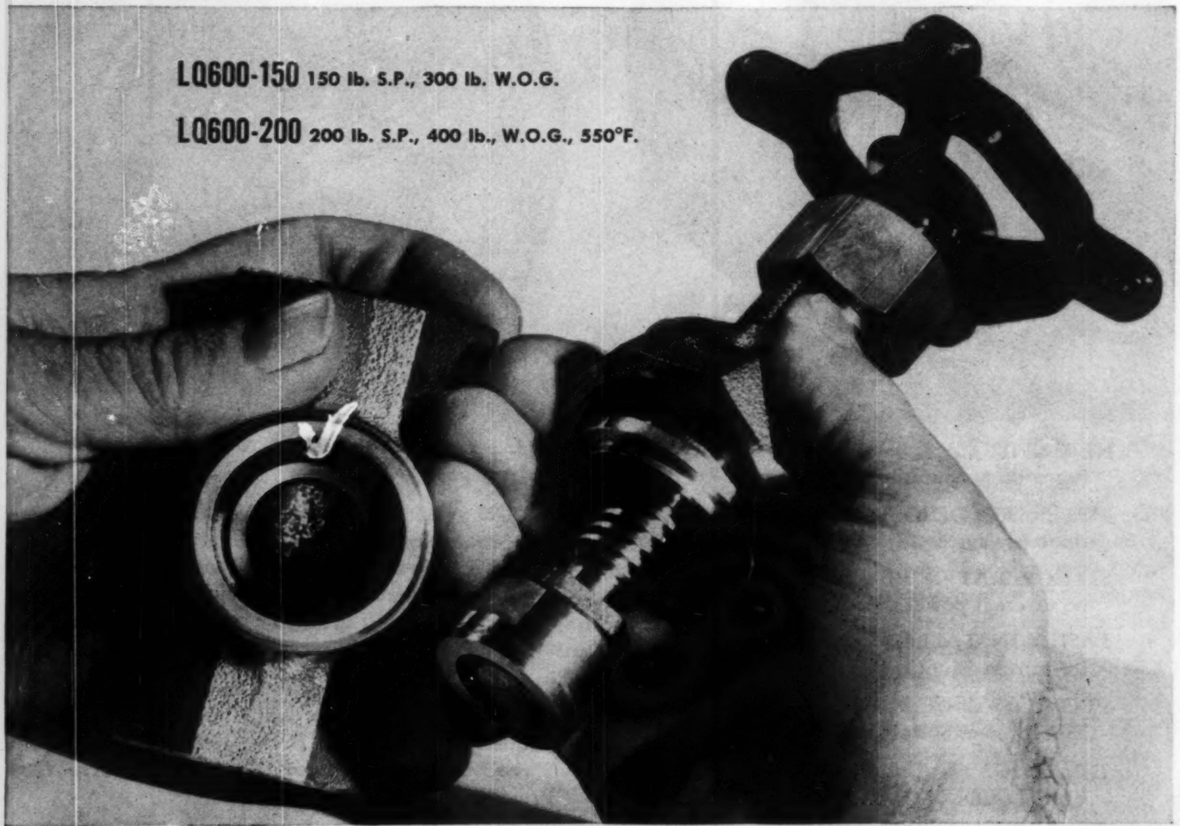
LQ600®

Here's Why: Long accepted valve maintenance costs are a thing of the past in thousands of plants where LQ600's have been installed . . . even in the most severe services where previous valves required repair or replacement after as little as two weeks on the line.

These outstanding savings are made possible by seats and discs of Brinalloy®, a patented Lunkenheimer alloy that is more resistant to wear and corrosion than 500 Brinell Stainless or 1000 Brinell Case-Hardened Stainless Steel.

Add to this the Lunkenheimer exclusive silicon-bronze Stemalloy®, the most durable stem material ever put into a valve, and you have two important reasons why LQ600's have established new low-maintenance standards everywhere they are installed.

For an actual comparison test, call the Lunkenheimer Distributor in your area. He is an expert on valve maintenance costs and will be glad to demonstrate the maintenance-saving benefits you receive when you install LQ600's . . . or write The Lunkenheimer Company, Cincinnati 14, Ohio



LQ600-150 150 lb. S.P., 300 lb. W.O.G.

LQ600-200 200 lb. S.P., 400 lb., W.O.G., 550°F.

LUNKENHEIMER QUALITY

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

8 REASONS WHY ENGINEERS CHOOSE "BUFFALO" PUMPS

Let's think of pumps in terms of hard service on the job — and the reasons why "Buffalo" Pumps deliver maximum efficiency with minimum maintenance for years and years of such service.

Note these rugged construction features of "Buffalo" Full Ball Bearing Single Suction Pumps:

1. Sturdy cast iron bearing stand and casing mounting ring. These components are interchangeable on all size pumps up to and including No. 3. Engineers like this feature, since they often effect economies by standardizing on one line of pumps with varying capacities.

2. Easily-renewable bronze wearing rings protect casing from wear.

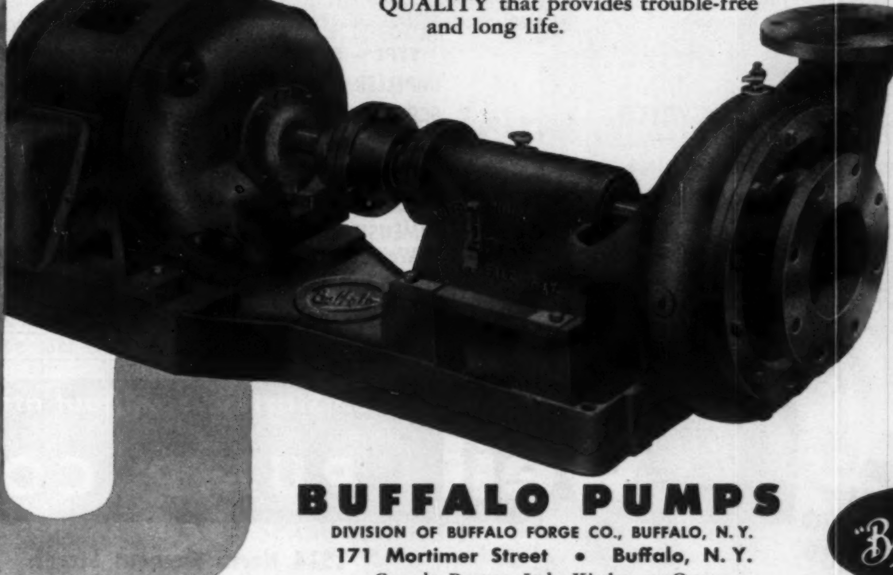
3. High efficiency bronze impeller. Enclosed type has liberal openings to handle abrasive solids. Open type, without wearing rings, is optional.

4. Oversize ball bearings running in oil provide rigid support for shaft and impeller.

Add to these the heavy cast iron frame, oversize shaft, extra-deep stuffing box, long-wearing gland with packing furnished — and you have a total of eight superior engineering features built into every "Buffalo" Single Suction Pump.

These plus many more high quality "Buffalo" components provide the sound reasons why engineers look to "Buffalo" Pumps for a long life of efficient, dependable, economical service. For your next heavy-duty pumping job, contact your nearby "Buffalo" Engineering Representative. He will be glad to work with you and help in every way. Or, write us direct for Bulletin 976-E.

"Buffalo" Pumps bring you the famous "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life.



"Buffalo"
Single Suction
Pump

BUFFALO PUMPS

DIVISION OF BUFFALO FORGE CO., BUFFALO, N. Y.
171 Mortimer Street • Buffalo, N. Y.
Canada Pumps, Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

"Buffalo" PUMPS

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

weil PUMP'S

New SUBMERSIBLE SUMP PUMP

Built for—Automatic Submerged Operation

A PACKAGED UNIT . . . . priced lower than many conventional Sump Pumps

Designed—

TO OPERATE UNDER WATER
Hermetically sealed motor with a leak-proof rotating shaft seal assures dependable performance at all times.

FOR ECONOMICAL INSTALLATION
Is easily installed in a metal tile or concrete sump 2′ to 8′ deep.

FOR SMALL SUMPS
Can be installed thru a 15″ opening.

FOR GAS-TITE INSTALLATIONS

FOR FLOOD-PROOF OPERATION
If current fails moisture cannot damage pump or motor.

Choice **OF 3 CONTROLS**

- **MICRO-SWITCH** Fool-proof and trouble-free. Recommended for most installations.
- **ELECTRODE** For special installations where clear water is being pumped.
- **FLOAT SWITCH** For Duplex Units. Operates pumps alternately or together as conditions demand.

NEW MICRO SWITCH MODEL SS-800 ILLUSTRATED

MOTOR: 1/3 HP, 1750 RPM, 110 volt **CAPACITOR TYPE** with 8 ft. waterproof cable and plug
IMPELLER: Bronze
SCREEN: Brass
BASE: Sturdy cast-iron
DISCHARGE: 1¼″
SHAFT: Stainless steel
DIMENSIONS: Height: 12¾″; Diameter: 11″; Weight: 50 lbs.

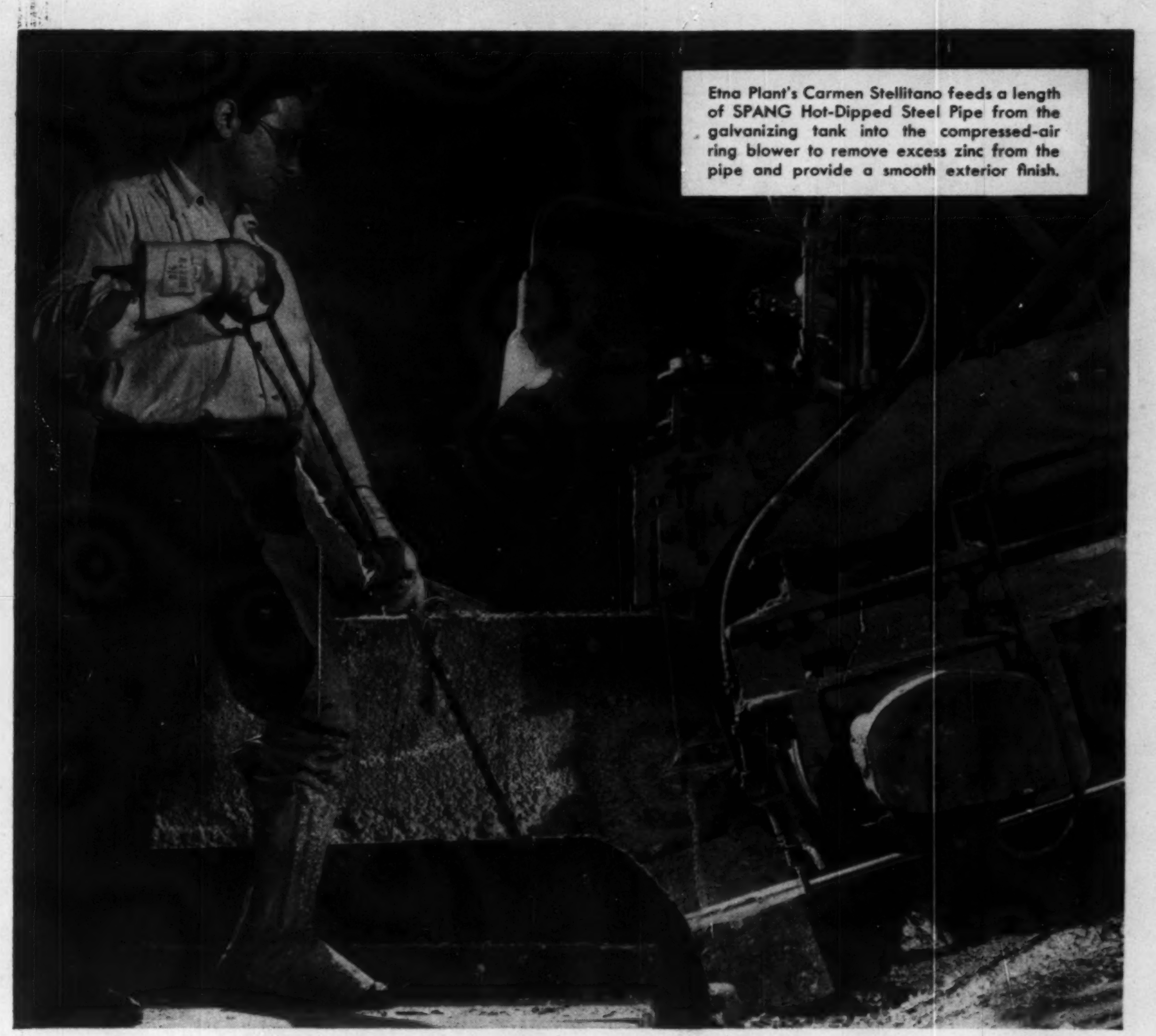
PERFORMANCE

Discharge Head (Ft.)	5	10	15	20	22	24
Capacity, GPH	3600	3350	2400	1830	1160	540

Engineered for One Million Starts . . . without attention

weil PUMP CO.

1514 North Fremont Street
Chicago 22, Illinois



Etna Plant's Carmen Stellitano feeds a length of SPANG Hot-Dipped Steel Pipe from the galvanizing tank into the compressed-air ring blower to remove excess zinc from the pipe and provide a smooth exterior finish.

Out of this galvanizing tank comes the best steel pipe* you can buy!

. . .**Spang, of course!*

AND HERE'S WHY . . .

UNIFORM STRENGTH—SPANG Steel Pipe is produced under close control during forming and welding to provide a uniform pipe that's easy to cut, bend and thread . . . and it's hydrostatically tested well above normal operation pressures to be sure you get a strong pipe for rugged use.

HEAVY-DUTY UNIFORM FINISH—of prime western zinc, air-wiped outside to produce a smooth, even finish that will stand up under severe bending strains . . . blown inside with superheated steam to provide a smooth finish for easy flow of liquids.

HIGH CORROSION RESISTANCE—Quick quenching of the hot galvanized pipe in a sodium dichromate solution gives a strong bonding of the finish to the steel . . . helps retard formation of white rust . . . adds extra service life to the pipe.

SPANG-CHALFANT
DIVISION OF
THE NATIONAL SUPPLY COMPANY
General Sales Offices: Two Gateway Center, Pittsburgh, Pa.

SPANG®
CW STEEL PIPE

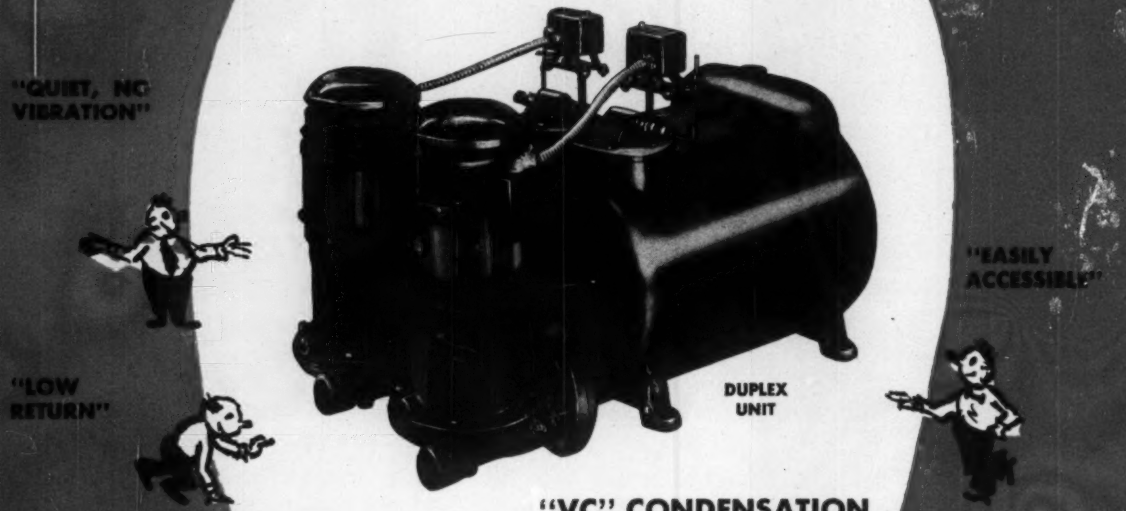
District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis

NEXT JOB
MAKE IT
SPANG®
STEEL PIPE!

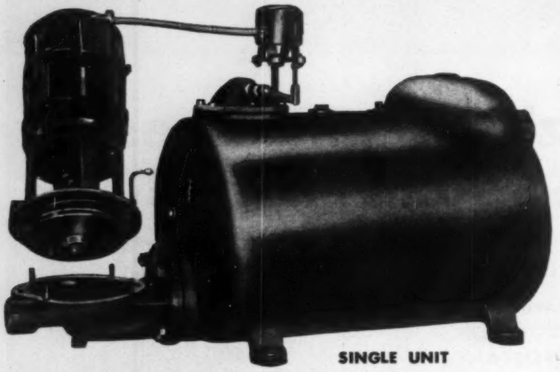
It's ideal for any piping installation, especially drainage and vent lines. You'll get quality every time. Save money in the long run, too! There's a SPANG Distributor near you, ready to give you quality service on your order.

Skidmore

SKIDMORE PUMPS have set a standard for performance and dependability since 1921



"VC" CONDENSATION PUMP AND RECEIVER


SINGLE UNIT

ACCESSIBLE FOR INSPECTION

The entire motor and pump unit may be removed for inspection or repair without disturbing piping or pipe connections. Vertical motor construction assures perfect balance and absence of vibration.

Proven Best —

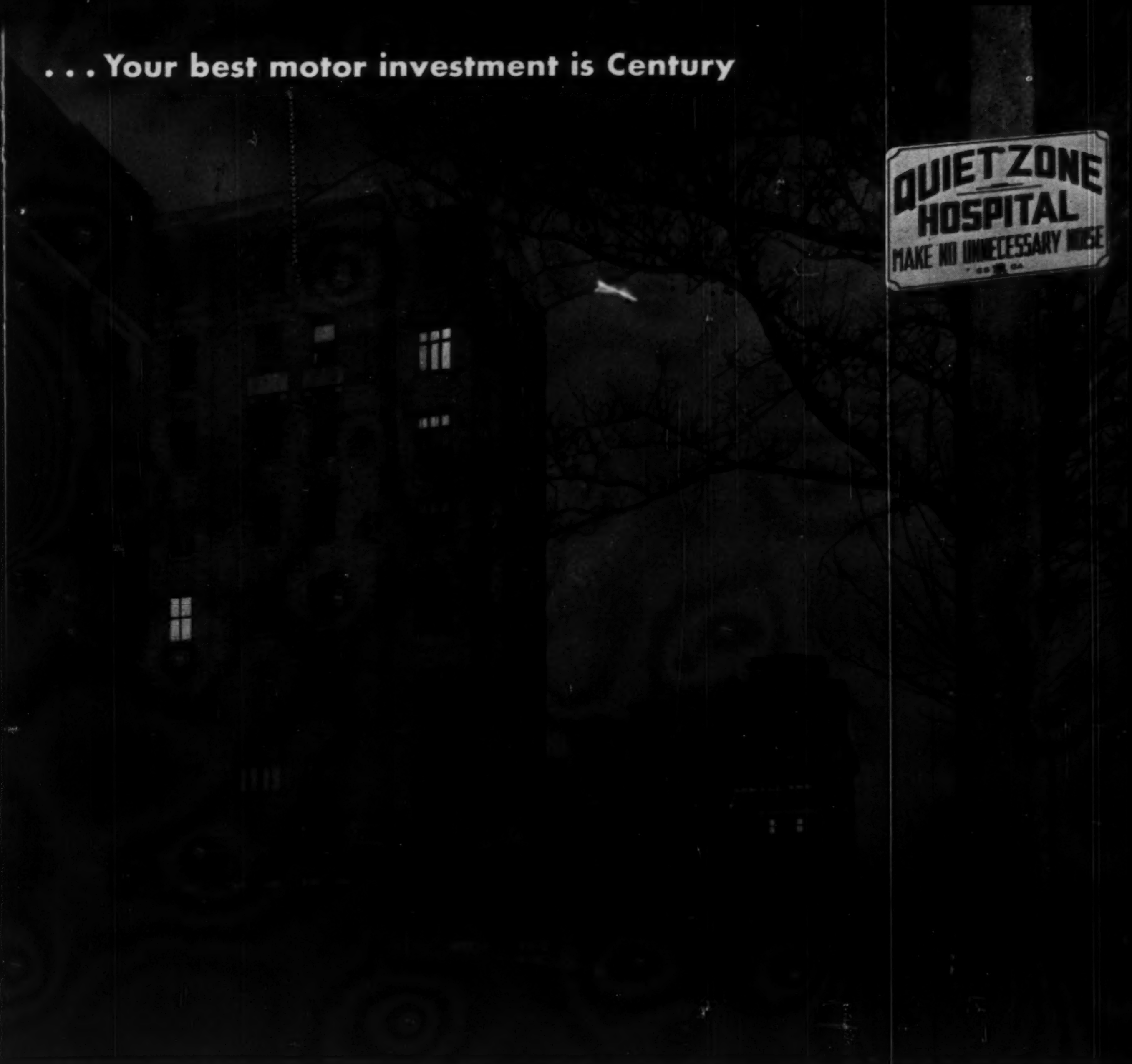
BY PERFORMANCE TEST!

Dependable under all types of conditions and continual service — year after year. The Skidmore "VC" Condensate Pump will handle hot condensate to the boiler or other points from all types of steam heating or process equipment. The unit operates at a wide range of pressures. Receiver has low inlet connection. Motor is elevated and float switch mechanism is mounted on top of receiver to avoid damage from seepage or flood water.

Specify a SKIDMORE PUMP on that next job . . . there's one for every installation.

SKIDMORE PUMPS

SKIDMORE CORPORATION
ST. JOSEPH, MICHIGAN


. . . Your best motor investment is Century
QUIET ZONE
HOSPITAL
MAKE NO UNNECESSARY NOISE

Quiet-running Century motors . . . wherever you need them

Quiet operation is one of the outstanding characteristics of standard Century motors.

Why do Century motors start and run so quietly? Because the design is right . . . electrically and mechanically. And because precision manufacturing guarantees such things as excellent mechanical balance. No wonder Century has such complete acceptance among manufacturers and users of air conditioning, refrigerating, heating and ventilating equipment. Here, particularly, quiet motors are a *must*.

Wherever your equipment is used, quieter Century motors can result in less worker fatigue, greater efficiency as well. And they run smoother, perform better, last longer.

Quietness . . . just one of the features that makes Century your best motor investment. Call your local Century man or Authorized Century Distributor.

Century
MOTORS

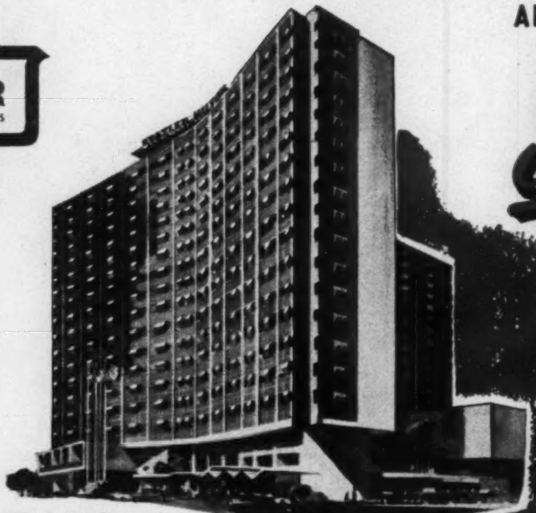
CENTURY ELECTRIC COMPANY
St. Louis 3, Missouri • *Offices and Stock Points in Principal Cities*

BRUNER
INDUSTRIAL WATER SOFTENERS

ARE FREQUENTLY

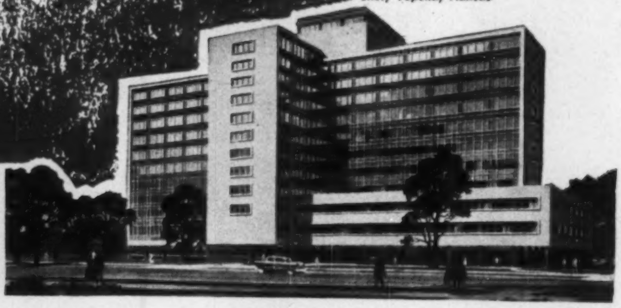
Specified

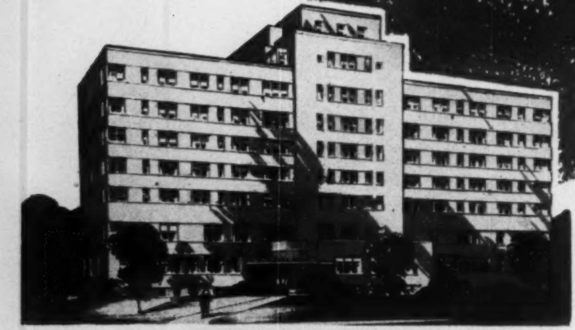
BY LEADING ARCHITECTS
FOR IMPORTANT
INSTALLATIONS!



STATLER HILTON HOTEL, Dallas, Texas
Architect: William B. Tabler, New York, N. Y.
Consulting Engineers: Jaros, Baum and Bolles, New York, N. Y.
Plumbing Contractor: Brown and Olds [illegible] Co. Dallas, Texas

SAS STATE OFFICE BUILDING,
Topeka, Kansas
Architect: Kansas State Architect's Office
Plumbing Contractor: Sheahan and Degan, Inc., Topeka, Kansas



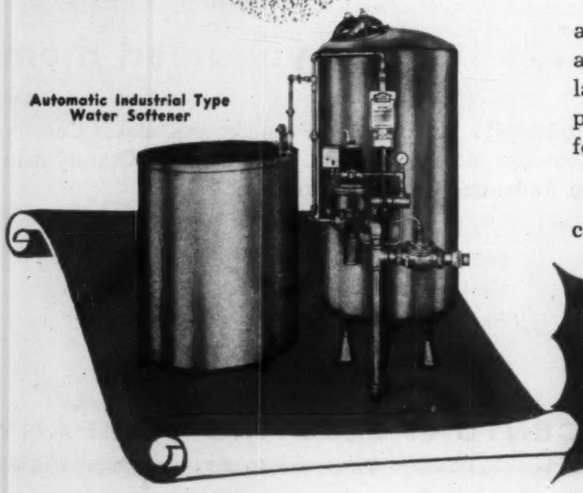


ST. LUKE'S HOSPITAL,
Architect: Gerrit J. de Gel
Milwaukee, Wis.
Plumbing Contractor: William Faust Co.
Milwaukee, Wis.

These important new public buildings are serviced by Bruner industrial water softeners. Bruner softeners, filters and other water conditioning equipment are available from stock in most types and sizes. Custom installations are built to exact specifications.

You'll find Bruner equipment now installed in public and private buildings, large and small, in all 48 states and in seven foreign countries. Uses range from small laundries and schools to hospitals and atomic energy plants. Bruner is proud of its customer service — famous for product quality.

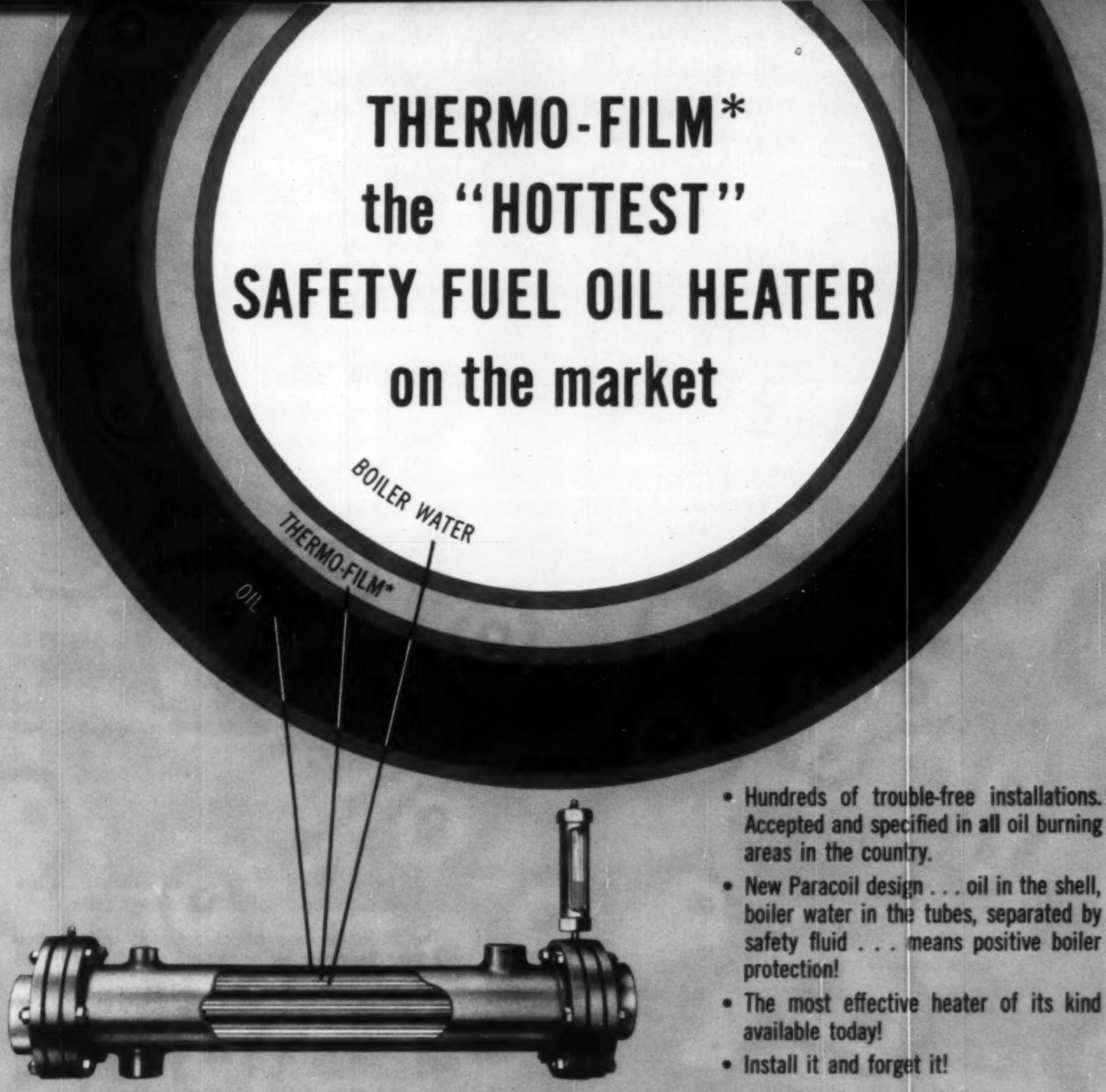
Your inquiry is earnestly solicited. No obligation, of course.



Automatic Industrial Type Water Softener

BRUNER CORPORATION
America's most complete line of quality water softeners and filters
Executive Offices: 4763 N. 32nd St., Milwaukee 9, Wis.
Plants: Milwaukee, Wisconsin, and Los Angeles, California
Sales and Engineering Offices in all principal cities.

THERMO-FILM* the "HOTTEST" SAFETY FUEL OIL HEATER on the market



- Hundreds of trouble-free installations. Accepted and specified in all oil burning areas in the country.
- New Paracoil design . . . oil in the shell, boiler water in the tubes, separated by safety fluid . . . means positive boiler protection!
- The most effective heater of its kind available today!
- Install it and forget it!

Paracoil Safety-Barrier Fuel Oil Heater

Approved by Board of Standards
and Appeals, City of New York.
Cal. No. 321-55SA

This Paracoil Heater solves every one of the Consulting Engineer's and Contractor's problems. Compact. Light weight. No electric wiring, relays or vents. This means lowest installation cost.

Straight tube construction, 100% counterflow, extended tube surfaces and internal turbulence give highest heat transfer rate, hottest oil, with low pressure drop.

A Paracoil Thermo-Film will always deliver oil at the temperature you need at the capacity you require. It is available in standard sizes for immediate installation.

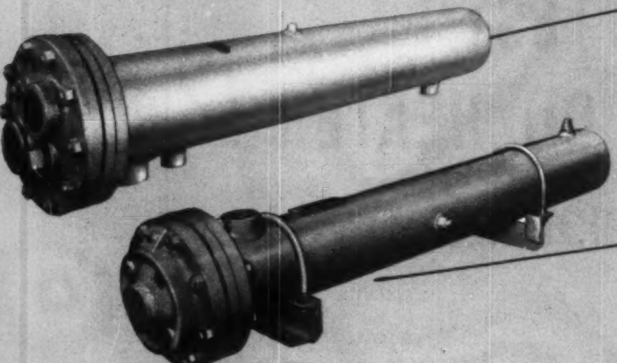
Write for Bulletin 60-N ***Davis Makes It — Better!***

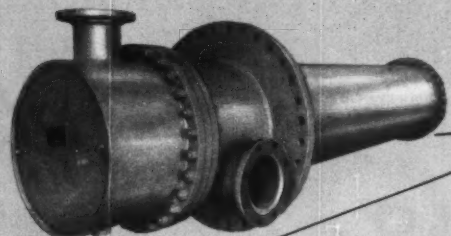
DAVIS ENGINEERING CORPORATION

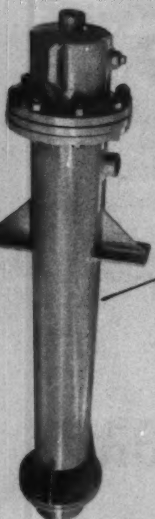
30 Rockefeller Plaza, New York 20, New York • Circle 6-5650

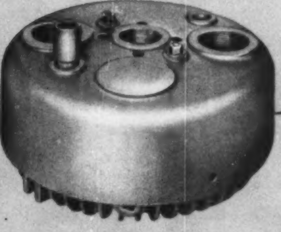
*Trademark/Patent Pending

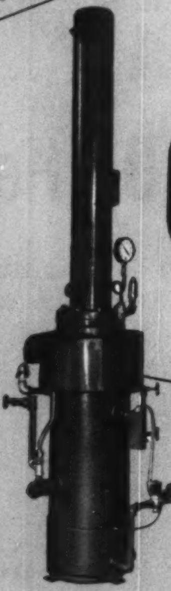
The most complete line of FUEL OIL HEATERS available to the industry











U-TUBE TYPE

for sub-water-line or steam

A 6-pass design for discharge side of fuel oil pump. A 2-pass design for suction side of fuel oil pump. Steel shell, C.I. oil chamber, and copper alloy tubes bent U-shape. Compact for concentrated heating capacities.

Write for Bulletin No. 60-A

TUBULAR TYPE

for use with high pressure steam

Baffled cross-flow of oil stream on outside of heating tubes. Remarkably high heat transfer rates with low pressure drops. Maximum capacity with minimum size.

Write for Bulletin No. 60-C

HORIZONTAL STRAIGHT TUBE TYPE

a basic design built in many sizes and capacities for low and high pressure oil systems

Paracoil straight type designed for large capacity installations — permits quick access to tube ends without disturbing either oil or steam connections. Use of Paracoil split shell expansion joint in right end of shell is characteristic of careful engineering design built into all Paracoil exchangers.

Write for Bulletin No. 60-Y

HORIZONTAL AND VERTICAL TANK SUCTION TYPE

for increasing fluidity of high viscosity oils and easing their removal from storage tanks

The horizontal type comes equipped with a shell bolting flange for mounting onto a tank nozzle. Also shown is an in-board flange to receive a shut-off valve, the closing of which permits the removal of the entire heater tube bundle even with a full tank.

The vertical type heater is introduced vertically into the tank through a shell manhole. Its horizontal shell brackets support it on the manhole frame.

Write for Bulletin No. 60-J

TANK SUCTION BELL TYPE

for the effective heating of tank-stored No. 6 fuel oil

Reduces viscosity of oil to facilitate ease of pumping from tank to oil burner.

Easily installed through standard 16" or larger manhole cover. Utilizes excess heated oil, steam, or hot water under forced circulation.

Perfect for the smaller one or two burner installations.

Write for Bulletin No. 60-H

INDIRECT GAS-FIRED FUEL OIL TYPE

maintains oil circuit temperatures during periodic main boiler plant shut-down

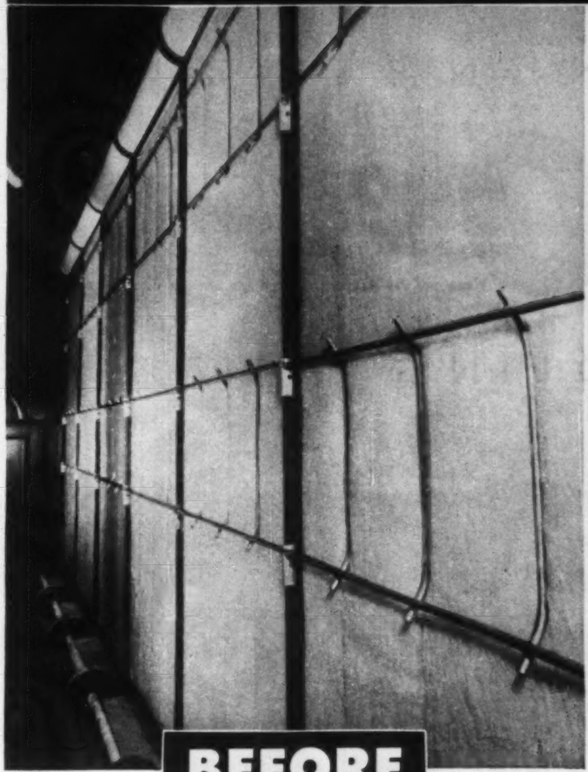
protects main boiler plant against oil leak contamination

A self-contained package unit combining a highly efficient gas-fired **Steam Vapor Generator** and a high heat transfer **tubular type fuel oil heater.**

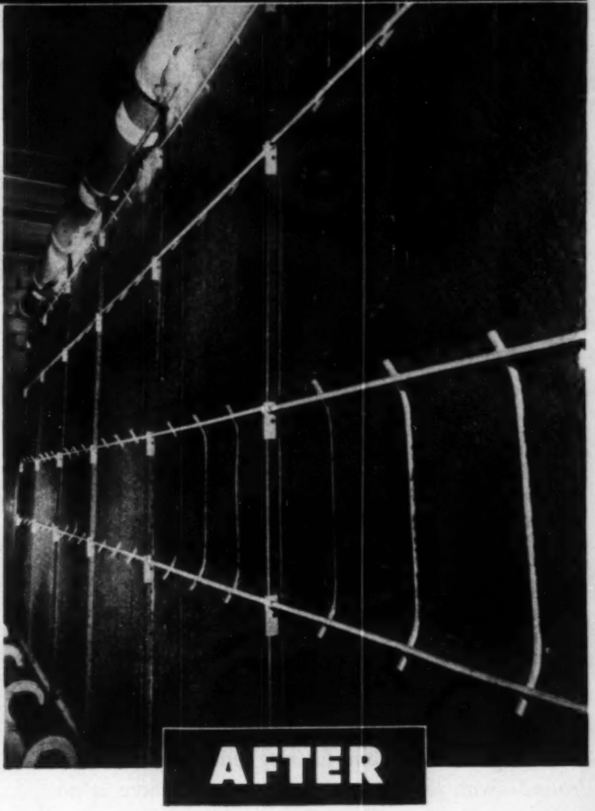
Write for Bulletin No. 60-L

DAVIS ENGINEERING CORPORATION
30 Rockefeller Plaza, New York 20, New York • Circle 6-5650

AAF Roll-O-MATIC air filter on the job



BEFORE



AFTER

...and filter maintenance is as simple as changing film in a camera!

These pictures show why builders of the new addition to the Union Pacific Office Building in Omaha, Nebraska, turned to AAF for clean air. This installation is in the existing part of the building and shows amazing AAF Roll-O-Matic air filters (1) right after installation and (2) after months of operation. They automatically clean 218,600 cfm in this building.

The only maintenance on the Roll-O-Matic is substitution of a clean roll of media when the old one has rolled automatically down and rewound (with its dirt load) at the bottom of the filter. In the new addition, Roll-O-Matic will share top billing with another AAF filter—the Electro-CELL. This electrostatic precipitator removes the tiniest particles (even smoke) from the air and automatically washes its own plates. These two AAF filters will clean 120,000 cfm in the new addition.

For more information on these products, see your local AAF representative or write for Roll-O-Matic Bulletin 248A and Electro-CELL Bulletin 252-E3A.

Herman Nelson Unit Blowers

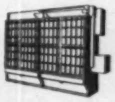
Herman Nelson Propeller Fans

American Air Filter
COMPANY, INC.

373 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

—BETTER AIR IS OUR BUSINESS—

Illinois Heating Specialties



AAF Filters and Precipitators

THEY CHANGE THEIR OWN FILTERS-AUTOMATICALLY!

HERMAN NELSON

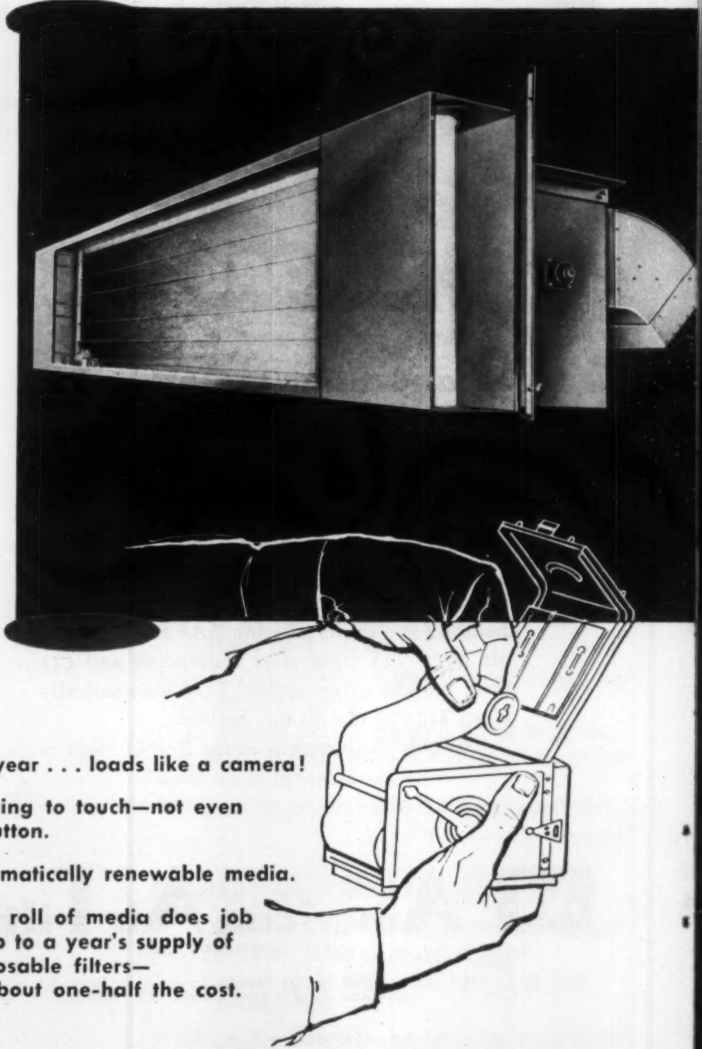
ROLL O VENT

AIR HANDLING UNITS

NEW, COMPLETELY AUTOMATIC IN OPERATION, the exclusive AAF Roll-O-Matic Air Filter Principle is now available on three leading Herman Nelson ROLL-O-VENT air handling units. You simply put the roll of media in the unit—*and forget it*—for up to a year! Operation is completely automatic, and under normal conditions costs just half that of ordinary disposable filters.

You gain maximum filtering efficiency *all year 'round*—with little or no maintenance. There is no reduction of efficiency in the system due to clogged filters. Furthermore, the system is always in balance—air flow *constant*—because clean media is automatically changed at just the right time!

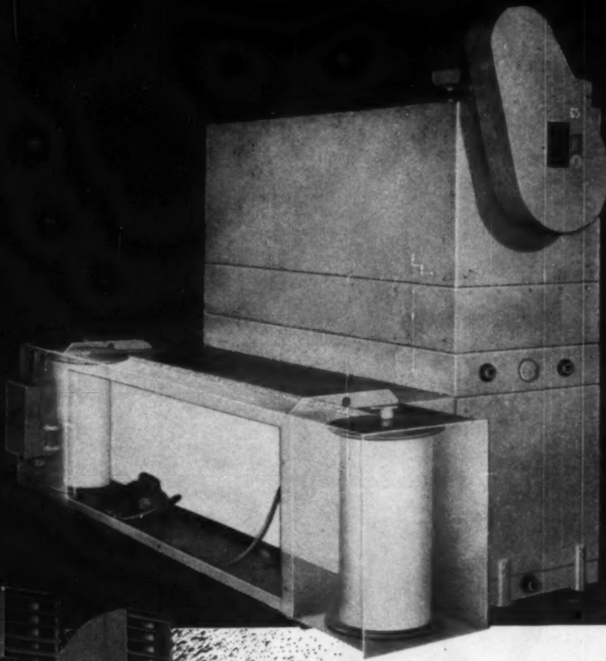
Take advantage of the important time and cost-saving features provided by this exclusive AAF development. Write for full details on "packaged" Herman Nelson ROLL-O-VENT heating, ventilating and cooling units. Ask for fact-filled Bulletin 780. Address Dept. 373.

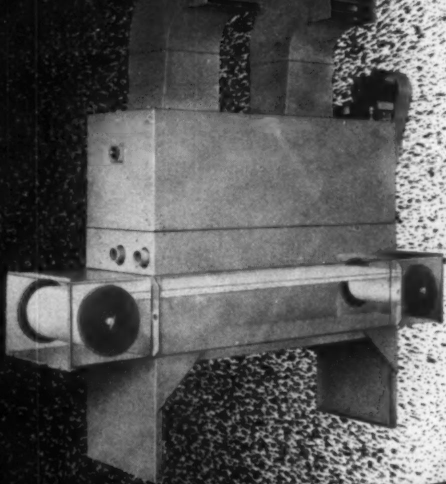


One roll of media lasts up to a year . . . loads like a camera!

- **Nothing to touch—not even a button.**
- **Automatically renewable media.**
- **Each roll of media does job of up to a year's supply of disposable filters—at about one-half the cost.**

BETTER AIR IS OUR BUSINESS

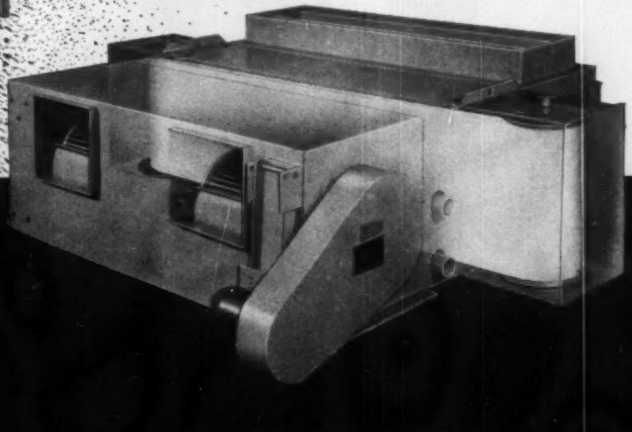




Herman Nelson
Roll-O-Vent
Air Conditioning Unit —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*

Herman Nelson
Roll-O-Vent
Industrial Unit Heater —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*

Herman Nelson
Roll-O-Vent
Heating And Ventilating Unit —*IT CHANGES ITS OWN FILTER—AUTOMATICALLY*



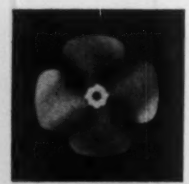
AAF
herman nelson

American Air Filter
Company, Inc.
215 Central Avenue • Louisville 8, Kentucky

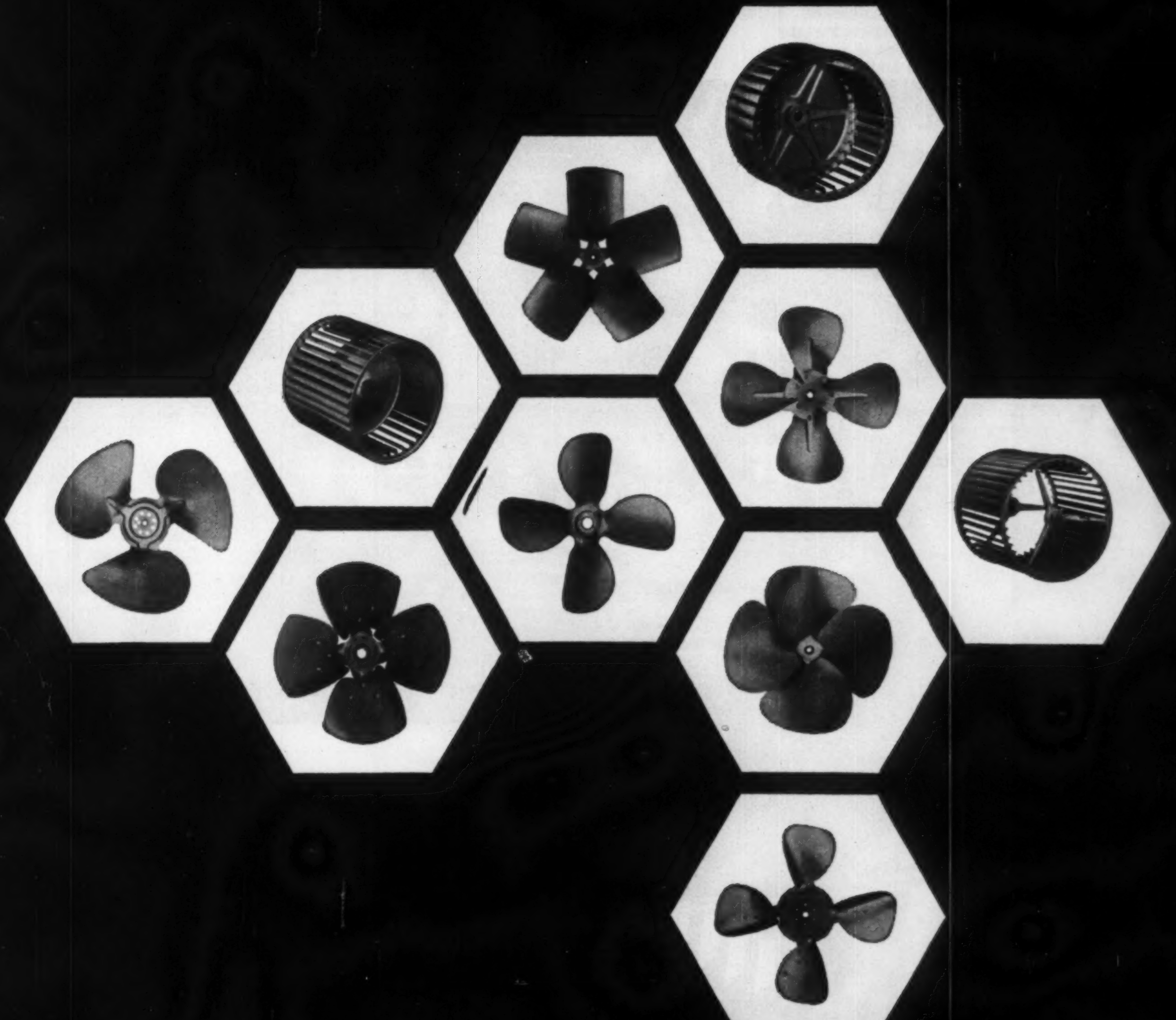
Torrington technology,
tools and testing facilities
have already solved upward
of half a million different details
in the design problems
of air impellers for industry.

TOOLED UP AND READY TO RUN

This means that Torrington
is literally tooled up and ready to run
on practically any air impeller
requirement you may have.
It means also that Torrington—where
engineers work only *on air moving problems*
—has a tremendous head start in meeting your most
difficult and cost-critical specifications for
advanced product development
...Talk to Torrington!



THE TORRINGTON MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT • VAN NUYS, CALIFORNIA • OAKVILLE, ONTARIO



Warm Welcome for the 1960 Winter Olympics

SQUAW VALLEY LODGE

Lifelines of CHASE®

SNOW RAPIDLY DISAPPEARS on the outdoor terrace of Squaw Valley Lodge. Thanks to Chase Copper Tube, this snow-melting system was quickly, efficiently and inexpensively installed.

At Tahoe City, California, they're getting ready for the first U. S. Olympics since 1932. For the most modern comfort and convenience, Squaw Valley Lodge has installed inside radiant heating and outside snow melting systems, using *20,000 feet of Chase copper tube!*

These Lifelines of CHASE copper tube will provide indoor warmth...melt snow swiftly on terrace and walks...*remain* free-flowing indefinitely.

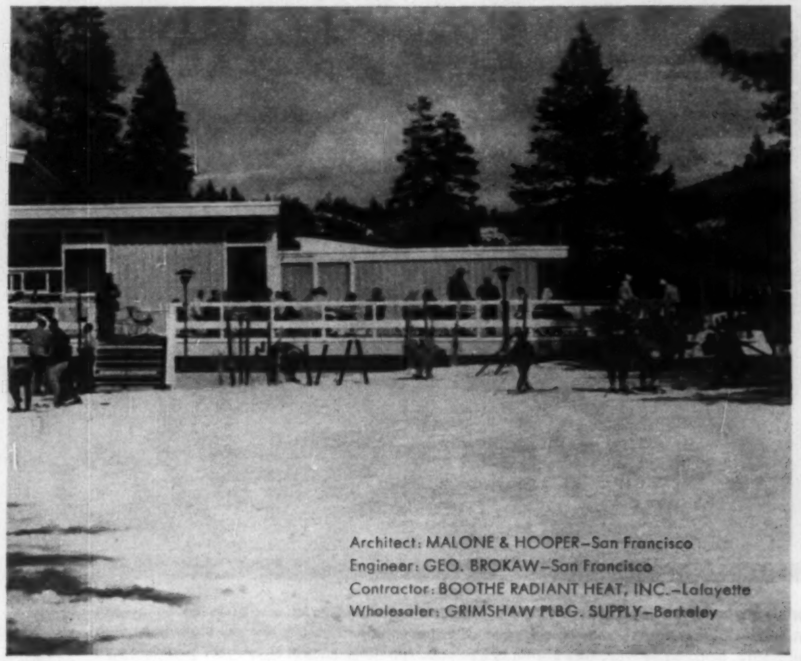
Chase®

The Nation's Headquarters for Brass, Copper and Stainless Steel

Atlanta Baltimore Boston Charlotte Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York (Maspeth, L. I.) Philadelphia Pittsburgh Providence Rochester St. Louis San Francisco Seattle Waterbury

installs Radiant Heating

COPPER TUBE!



Architect: MALONE & HOOPER–San Francisco
Engineer: GEO. BROKAW–San Francisco
Contractor: BOOTHE RADIANT HEAT, INC.–Lafayette
Wholesaler: GRIMSHAW PLBG. SUPPLY–Berkeley

CHASE copper tube is *known* for its superior quality and dependable, long-lasting performance. It was CHASE that pioneered copper tube and fittings. And over the years, more CHASE copper tube has been used in building than any other brand.

Whenever you want easy installation, trouble-free service and long-range value—always insist on Lifelines of CHASE copper tube. It never pays to settle for substitutes!

BRASS & COPPER CO.
WATERBURY 20, CONNECTICUT
SUBSIDIARY OF KENNECOTT COPPER CORPORATION

LIGHTWEIGHT, bendable Chase Copper Tube is so easy to handle, mechanics save time; do a better job faster.

EASY-TO-SOLDER, too, Chase Copper Solder-Joint Fittings go on in a jiffy. Long tube lengths mean fewer fittings required.

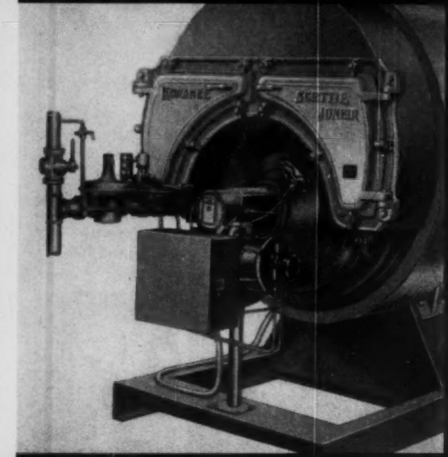
FREE-FLOWING water travels unobstructed and at full pressure over the years through radiant heating Lifelines of Chase Copper Tube.

PRESSURE-TIGHT, these properly installed Chase radiant floor heating lines are going in *for good.*

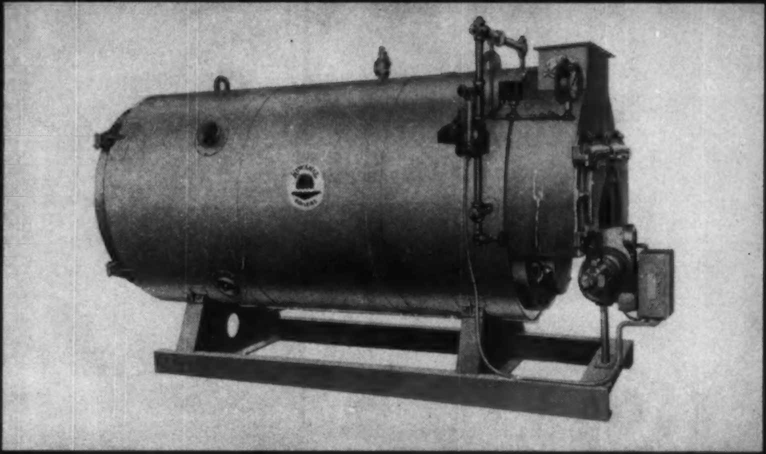
NEW!

KEWANEE®

FORCED-DRAFT



GAS-OIL COMBINATION FIRING for the new Kewanee package units is provided by this Kewanee burner designed for quick fuel changeover without adjustments.



NEW 606,000 TO 3,060,000 Btuh CAPACITIES: Kewanee Scottie Jr. low pressure boiler with Kewanee burner. Firing rate is balanced with boiler capacity. Oil burner (shown) is high pressure, twin nozzle type. Gas burner is equipped for either natural or LP gas.

another KEWANEE® quality product . . . proven in the field

Now . . . Kewanee provides 8 popular high pressure packages, 18 to 92 horsepower . . . 8 low pressure packages, 606,000 to 3,060,000 Btuh.

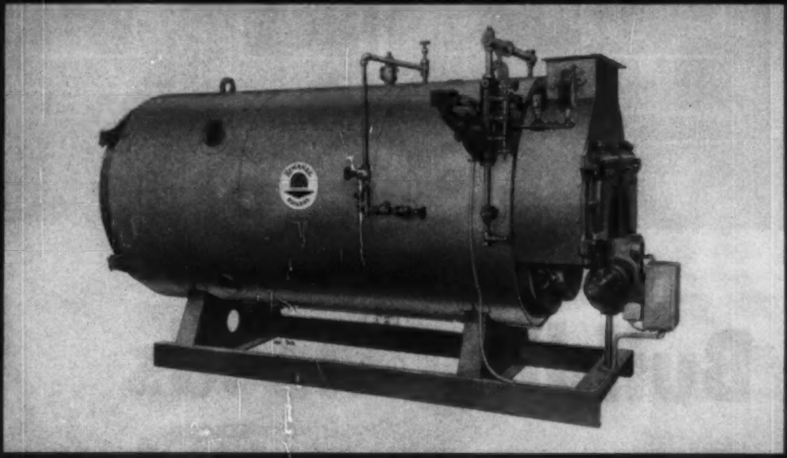
Forced-draft firing keeps combustion air supply constant, regardless of location or atmospheric conditions. Only a vent pipe is needed. The long, low lines of today's buildings are not violated by a costly, unsightly stack. Nor does the boiler room ceiling need to be higher than a standard 8 feet.

Fuel flexibility is provided by Kewanee burners for oil, gas or gas-oil combination firing. On combination units, fuel changeover is simple and fast . . . can be handled by automatic controls if desired.

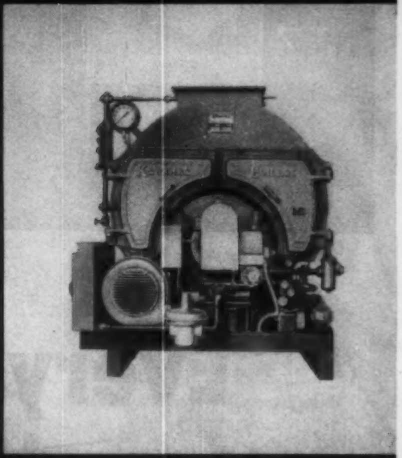
Traditional Kewanee quality is engineered into the complete unit. Reserve strength is built into

18 TO 92 HORSEPOWER

PACKAGE UNITS



NEW 18 TO 92 HP CAPACITIES: For 125-150 swp or high temperature water above 250° F. Kewanee Scottie Jr. high pressure boiler with a Kewanee burner for oil (shown) or gas. Features include long gas travel, ample steam space, x-rayed and stress relieved welds.



OTHER LARGER KEWANEE BOILERS range up to 651 hp for high pressure . . . 21,855,000 Btuh for low pressure. Matching forced-draft burners are available for oil, gas and gas-oil combination firing.

all parts . . . moving parts are accurately machined to close tolerances. All features of design and construction are aimed at maximum dependability and long-range economy. Easy access is provided for boiler inspection and cleaning.

Kewanee factory-assembles the entire unit before shipping. The boiler is fitted with burner and controls at the factory, with controls housed in integral control panel. Boiler gages and controls are in place, as well as rear combustion chamber of high temperature refractory. Unit is shipped as a complete package—fire-tested if desired.

Send coupon at right for complete information. Clip it today and mail it to:

AMERICAN-STANDARD, KEWANEE BOILER DIVISION,
101 Franklin Street, Kewanee, Illinois.

American-Standard
KEWANEE BOILER DIVISION
101 Franklin Street • Kewanee, Illinois

KEWANEE 1958 1868 90th year

Please supply literature on the following Kewanee Boilers:

☐ low pressure
☐ high pressure
☐ new 18 to 92 h.p. packages
☐ all capacities

Name______________________________

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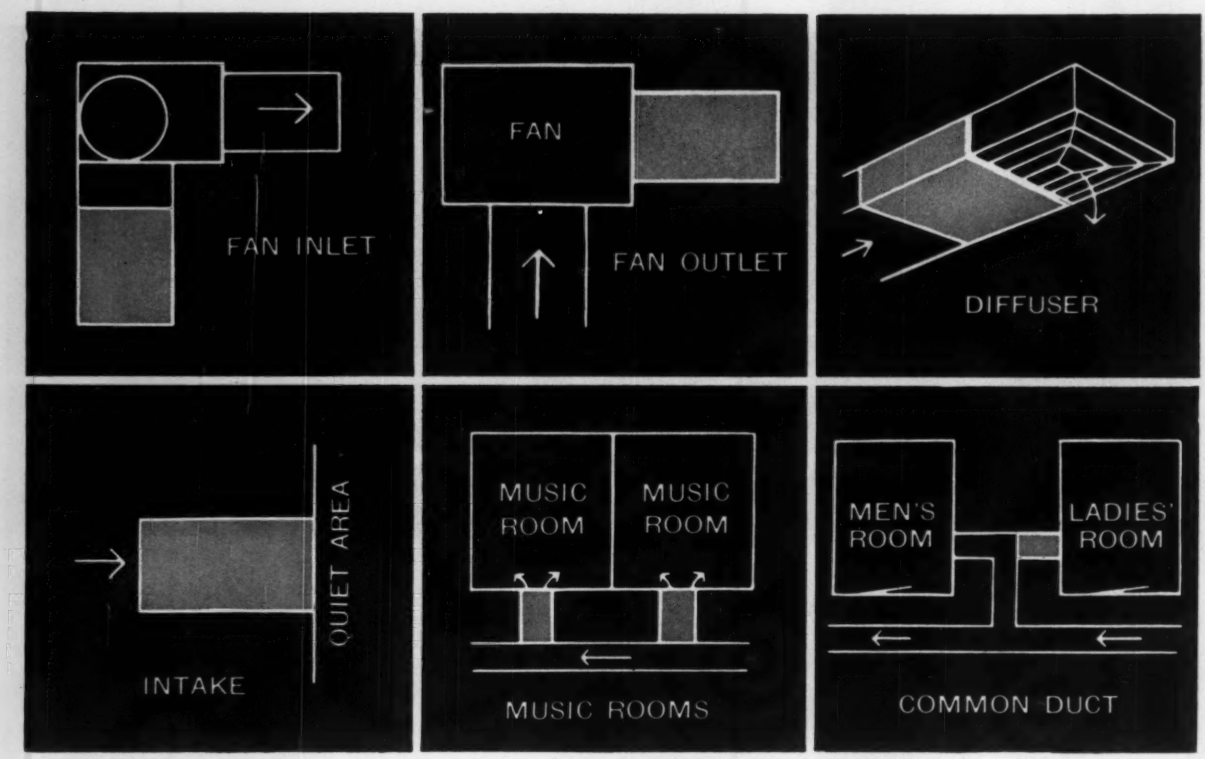
AMERICAN-Standard PRODUCTS

AMERICAN-Standard
KEWANEE BOILER DIVISION

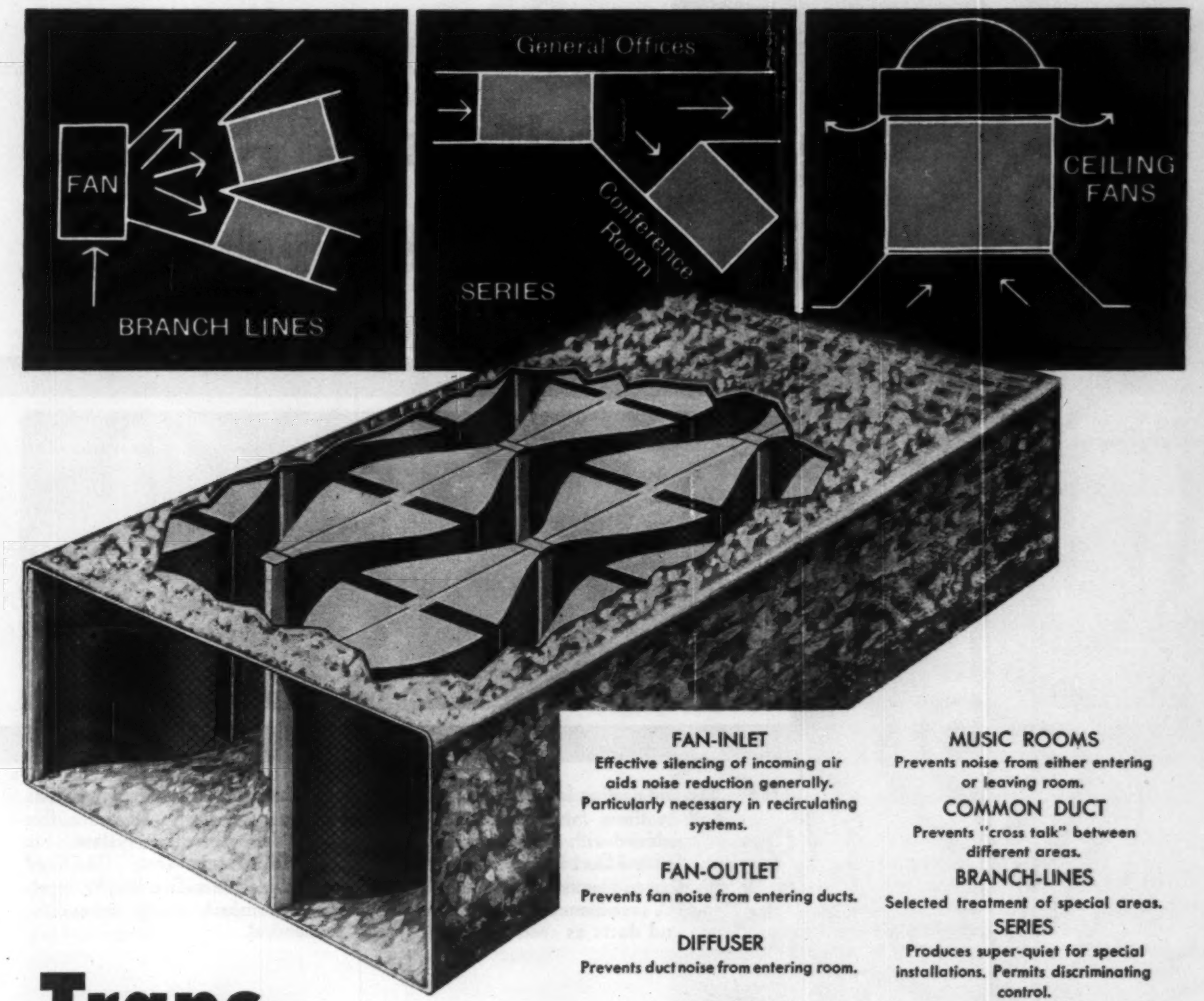

FAN INLET
FAN
FAN OUTLET
DIFFUSER
INTAKE
QUIET AREA
MUSIC ROOM
MUSIC ROOM
MUSIC ROOMS
MEN'S ROOM
LADIES' ROOM
COMMON DUCT

Every Building Needs Aircoustat® Sound

AIRCOUSTAT silences noises of all frequencies

Eliminate disturbance, distraction and irritation caused by noises escaping from one area to another through ductwork.

Install AIRCOUSTAT Sound Traps. AIRCOUSTAT eliminates guesswork, wasted space and unnecessary expense of duct lining. You can guarantee your client trouble-free performance. You can estimate with complete confidence the performance of particular applications. If AIRCOUSTAT fits geometrically, it fits acoustically.



FAN-INLET
Effective silencing of incoming air aids noise reduction generally. Particularly necessary in recirculating systems.

FAN-OUTLET
Prevents fan noise from entering ducts.

DIFFUSER
Prevents duct noise from entering room.

INTAKE
Prevents outside noise from entering quiet area.

MUSIC ROOMS
Prevents noise from either entering or leaving room.

COMMON DUCT
Prevents "cross talk" between different areas.

BRANCH-LINES
Selected treatment of special areas.

SERIES
Produces super-quiet for special installations. Permits discriminating control.

CEILING FANS
Prevents fan and exhaust noise from disturbing particular areas.

Traps

traveling from one area to another through ductwork

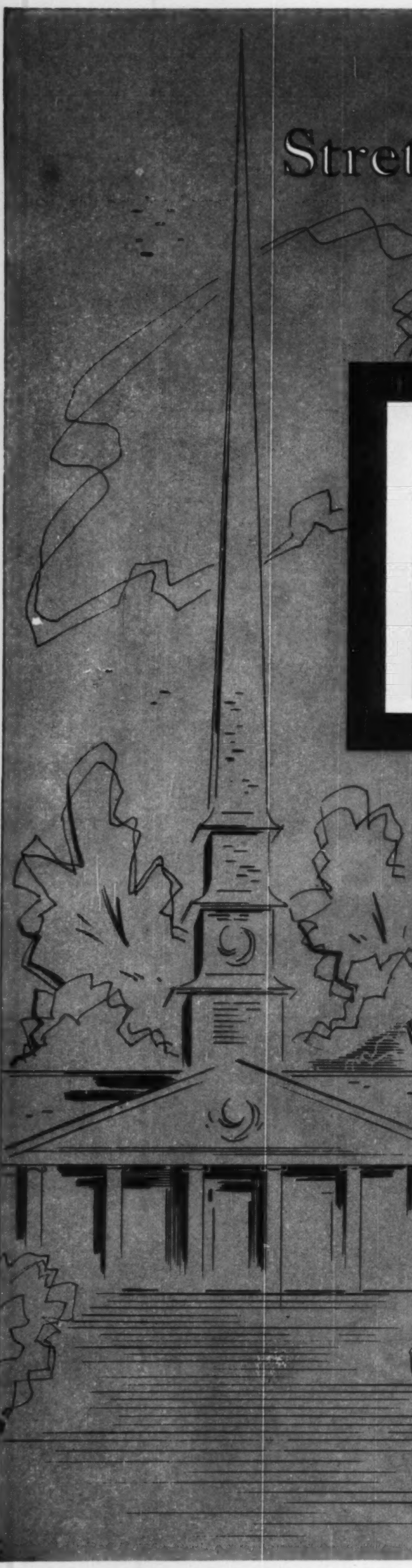
AIRCOUSTAT saves you space. Its greater effectiveness permits smaller-sized ducting. It eliminates bulky mufflers.

For more details, write to KOPPERS COMPANY, INC. Industrial Sound Control Dept., 6203 Scott Street, Baltimore 3, Md.

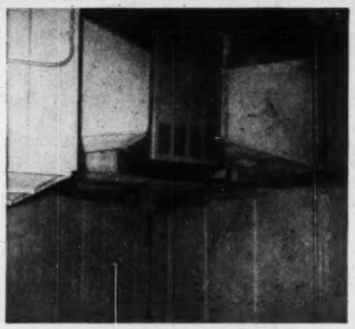
KOPPERS

INDUSTRIAL SOUND CONTROL

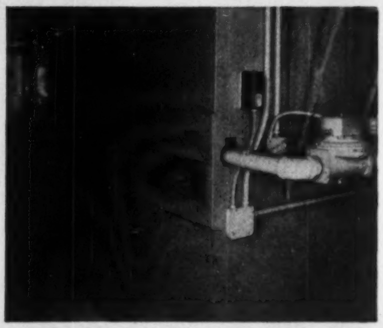
Engineered* Products Sold with *Service



Stretch Budgets for Church with Janitrol



Heating and cooling for this church is handled by three Janitrol Duct Furnaces, combined with a 60-ton cooling system. Janitrol Duct Furnaces are especially designed for use in combination systems . . . save money by using same blowers and ducts as cooling system.



Unusual quietness in operation wins praise from pastor and congregation for this Janitrol gas-fired central system. Six Janitrol BDC Heavy Duty Gas-Fired Heaters provide 1½ million Btu/hr. input. System is compact, easily accessible, and economical.

When you are specifying heating or cooling equipment for needs peculiar to churches, it will pay you to know these facts.

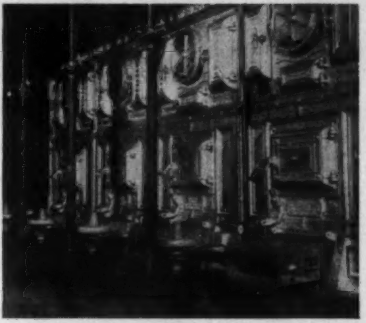
Janitrol's complete line of equipment for new construction and modernization includes units for virtually every church heating and cooling requirement . . . with unusual flexibility of installation. Whether the job calls for a compact central system, multiple

winter conditioners adaptable for summer cooling

. . . with installation of Janitrol's new air-cooled cooling system that uses no water, eliminates water service and maintenance costs. May be installed concurrently with winter conditioner, or any time later, without additional ductwork.

Building and Modernization Heating and Air Conditioning

Separate central systems to heat upstairs and downstairs rooms were installed in this church modernization job. The ultimate in a compact, efficient, automatic installation was achieved with Janitrol gas heating equipment.



If the old heating system is in good shape, conversion to automatic gas heat with Janitrol High Capacity Gas Conversion Burners is often the best answer. They're designed for large capacity systems. This installation uses four Janitrol SC-05 burners.

Janitrol gas unit heaters work independently of central system to heat large gymnasium . . . provide fast, low-cost heating and temperature control required by the varying activities program. Janitrol unit heaters are designed for dual-fuel operation, save floor space, insure low maintenance costs.

units, or a combination of both, Janitrol brings you welcome design freedom!

Purchase costs are well in line, too. And, superbly designed, solidly built Janitrol equipment minimizes installation costs. You can enhance your reputation with Janitrol quality, even on modest budget jobs.

Of course, you want to insure your client's satisfaction for the years to come as well. And thousands of Janitrol installations testify that Janitrol quality means top-level comfort, with important savings in operating and upkeep costs.

Look into Janitrol equipment for your next job. Our engineers will gladly work with you in developing complete specifications. Call your Janitrol office, or write Janitrol Division, Columbus 16, Ohio.

Janitrol

JANITROL HEATING & AIR CONDITIONING DIVISION
SURFACE COMBUSTION CORPORATION
COLUMBUS 16, OHIO
IN CANADA: MOFFAT HEATING & AIR CONDITIONING DIVISION
MOFFATS, LTD., TORONTO 15
Also Makers of Surface Industrial Furnaces, Kathabar Humidity Conditioning, Janitrol Residential Heating and Cooling Equipment.

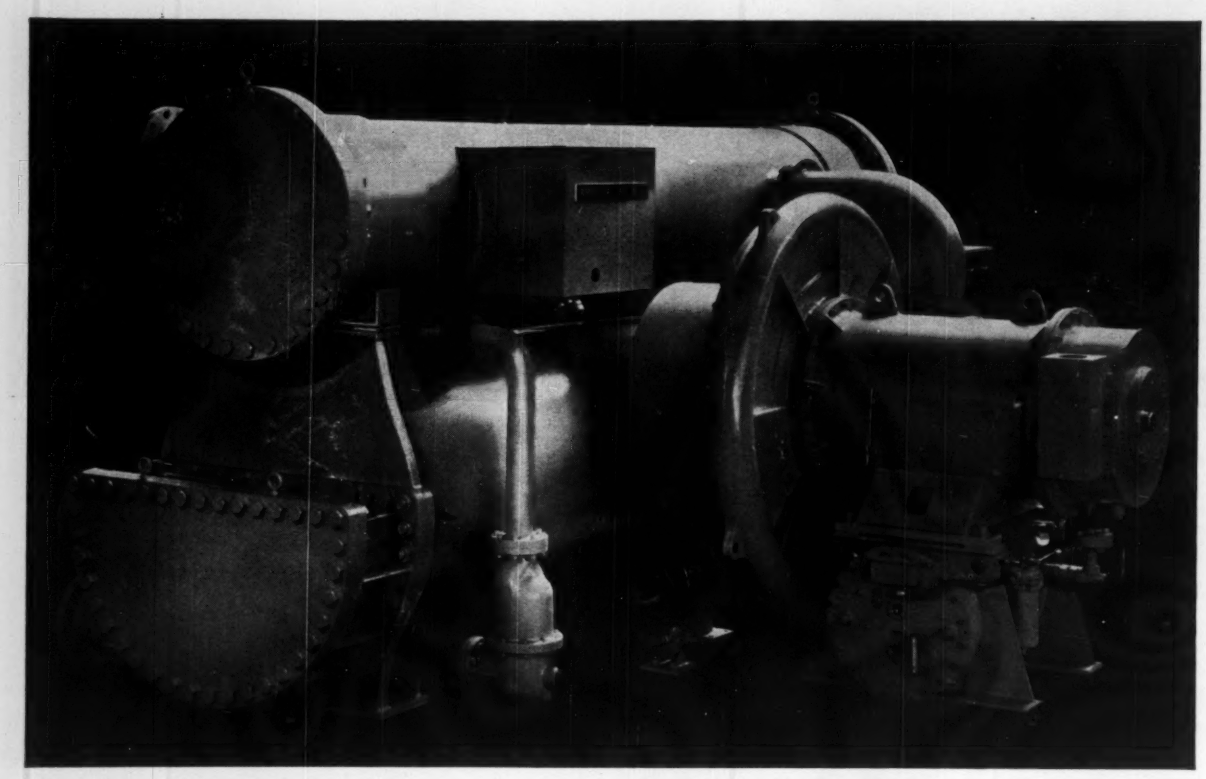
Architects' and Engineers'
information service

Write today for complete A.I.A. files on heating with gas in big buildings of every type, and for Janitrol specifications service. There's no obligation.

FOR AIR
CONDITIONING
EQUIPMENT
FOR ANY JOB

GET A BID FROM

CENTRIFUGAL REFRIGERATION MACHINES



American Blower Tonrac® maintains constant chilled water temperature . . . regardless of load. Its advanced single stage design and hermetic construction provide improved performance and quieter operation. TONRAC comes as a compact, self contained unit, easier and less costly to install with its single level construction.

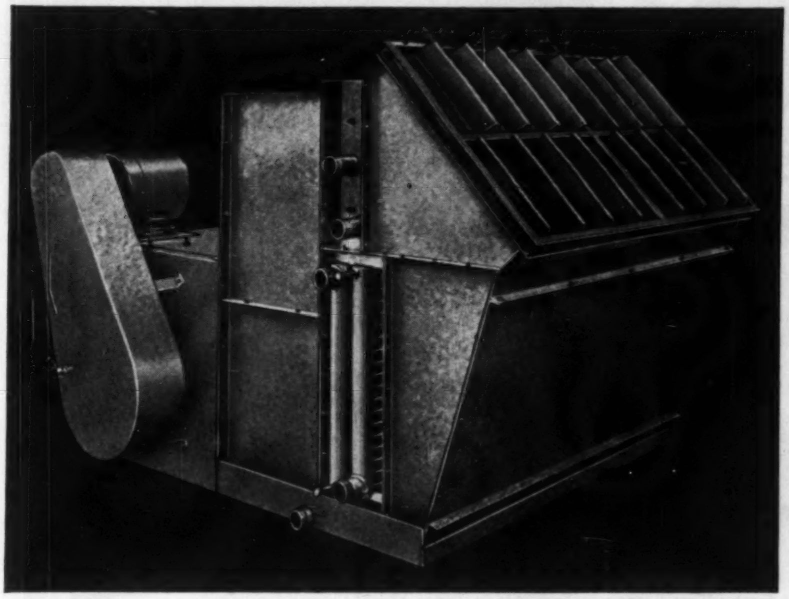
You can pinpoint responsibility for equipment performance, delivery dates, user satisfaction on *any* air conditioning system you plan by using American Blower equipment . . . the *complete* line that's designed, engineered, and manufactured to work together.

Remember, when you think in terms of American Blower, you think in terms of a manufacturing organization that supplies more of the vital components for air conditioning, refrigeration, heating, and ventilating, than any other in the world.

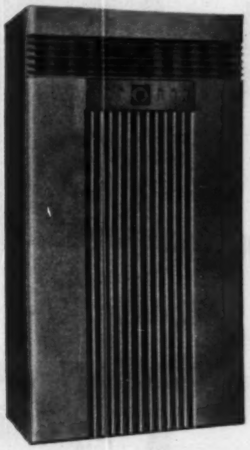
And 73 branch offices offer local product help or nationwide sales-service coordination. Call *your* American Blower man. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER!

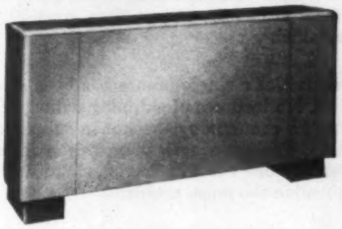
ALL COMPONENTS FOR ANY TYPE OF SYSTEM



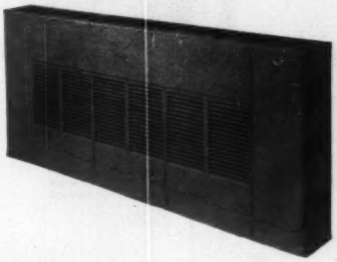
Type AB Multi-Zone Unit is in one arrangement for either horizontal or vertical air flow. A diffusion section is furnished between the fans and coils to distribute the air evenly over the entire face of the cooling and heating coils.



Packaged Air Conditioners — sizes from 3 to 20 tons; sound-insulated — a unit for every business! Air or water cooled models, for use with or without ductwork.



New Fancoil Units cool or heat individual rooms in multi-room structures. Operate on "flo-thru" principle. Save space — only 9¼" deep. Vertical or horizontal mountings.



Inductor Units for cooling or heating multi-room buildings. Can be connected in series. Mounted vertically or horizontally (without excessive casing depth). Wide range of sizes.

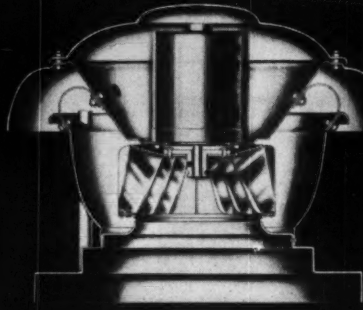
For further information, write:
American-Standard,* American Blower
Division, Detroit 32, Michigan

*AMERICAN-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation.

AMERICAN-Standard
AMERICAN BLOWER DIVISION

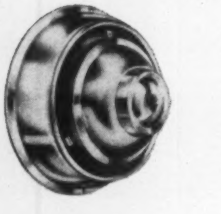
Quiet-Tested . . . Now Time-Tested . . .

OVER 50,000 CASE HISTORIES CAN'T BE WRONG!



Jenn-Air Quiet-Tested Centrifugal Direct Drive Roof Exhauster, with U-Spring Suspension Mounting. U-Springs suspend the power assembly, isolate it from the base. Noise caused by vibration is virtually eliminated.

Why U-Spring Cushion Suspension Mounting . . . by JENN-AIR . . . has now been adapted to JENN-AIR Axial Roof and Centrifugal Wall Exhausters

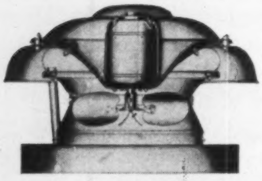


Jenn-Air Quiet-Tested Centrifugal Wall Exhauster, with U-Spring Suspension Mounting. Eliminates most duct work. Provides a means of ventilation through the wall.

The Facts: Two years ago Jenn-Air incorporated U-Spring Cushion Suspension Mounting in its Quiet-Tested Direct Drive Roof Exhausters. Since then, over 50,000 units have been installed.

The Facts: Not a single failure has been reported. No breakage on record. No instance of shipping damage (wheel binding into inlet), a common occurrence in rubber insulated ventilators . . . Jenn-Air U-Springs absorb the shock of rough handling. Only six recorded cases in 50,000, where the U-springs failed to solve the noise problem.

The Facts: U-Spring Cushion Suspension Mounting—which shows 44% less vibration transmission than rubber or neoprene—has now been adapted to Jenn-Air Axial Roof and Centrifugal Wall Exhausters. Another in the long line of Jenn-Air "firsts" that includes: *first* with *true* low contour design . . . *first* with spun aluminum construction . . . *first* with Quiet-Testing in Jenn-Air's exclusive Sound-Elec Test Chamber . . . *first* with motors lubricated for ten years of normal operation.

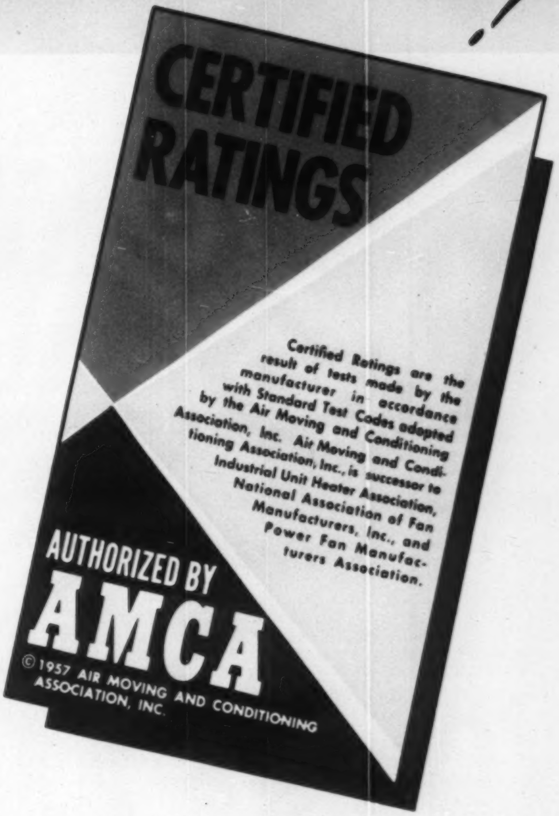


Jenn-Air Quiet-Tested Axial Roof Exhauster, with U-Spring Suspension Mounting. Recommended for general ventilation work and duct-type application.

The Facts explain why you can look to Jenn-Air for quality-engineered exhausters that never wait for the rest of the field to catch up.

JENN-AIR PRODUCTS COMPANY, INC.
1102 Stadium Drive, Indianapolis 7, Indiana
MEMBER, AIR MOVING AND CONDITIONING ASSOCIATION

BE SURE THAT THE STANDARD CATALOGUED AIR MOVING EQUIPMENT YOU SPECIFY OR USE BEARS THIS SYMBOL



CERTIFIED RATINGS

Certified Ratings are the result of tests made by the manufacturer in accordance with Standard Test Codes adopted by the Air Moving and Conditioning Association, Inc. Air Moving and Conditioning Association, Inc., is successor to Industrial Unit Heater Association, National Association of Fan Manufacturers, Inc., and Power Fan Manufacturers Association.

AUTHORIZED BY AMCA

©1957 AIR MOVING AND CONDITIONING ASSOCIATION, INC.

It is your best assurance of properly rated air moving equipment

Every possible precaution to protect you against incorrect or improper performance ratings has been provided for in the Certified Rating Program of the Air Moving and Conditioning Association.

As a result, you can rely on published performance data of centrifugal, axial, and propeller fans, and power roof ventilators which carry the AMCA Certified Rating Seal.

HERE'S HOW AMCA CERTIFIED RATINGS PROTECT YOU

All Tests Must Be Made in AMCA Qualified Laboratories

To qualify for AMCA Certified Ratings, products must be tested in a laboratory approved by AMCA after careful inspection of test equipment, procedure, and personnel.

All Ratings Determined by Uniform Test Code

Manufacturers' published performance ratings for AMCA certified products must be the result of tests and permitted calculations made according to the AMCA Standard Test Code.

Protection Against Misuse of the Certified Rating

The Certified Rating Seal is the property of AMCA. The right to use it may be withdrawn for any violation of the license agreement between AMCA and the manufacturer.

Additional safeguards provide for check of manufacturers' published performance ratings; and for periodic inspection of qualified test laboratories.

Manufacturers Qualified for AMCA Certified Ratings

The leading U.S. and Canadian manufacturers of air moving equipment are participating in this program. While space limitations do not permit a complete listing here, this information is available upon request to AMCA.

Product Specifiers

Write for
Bulletin
153-57

Product Users

Write for
Bulletin
152-57

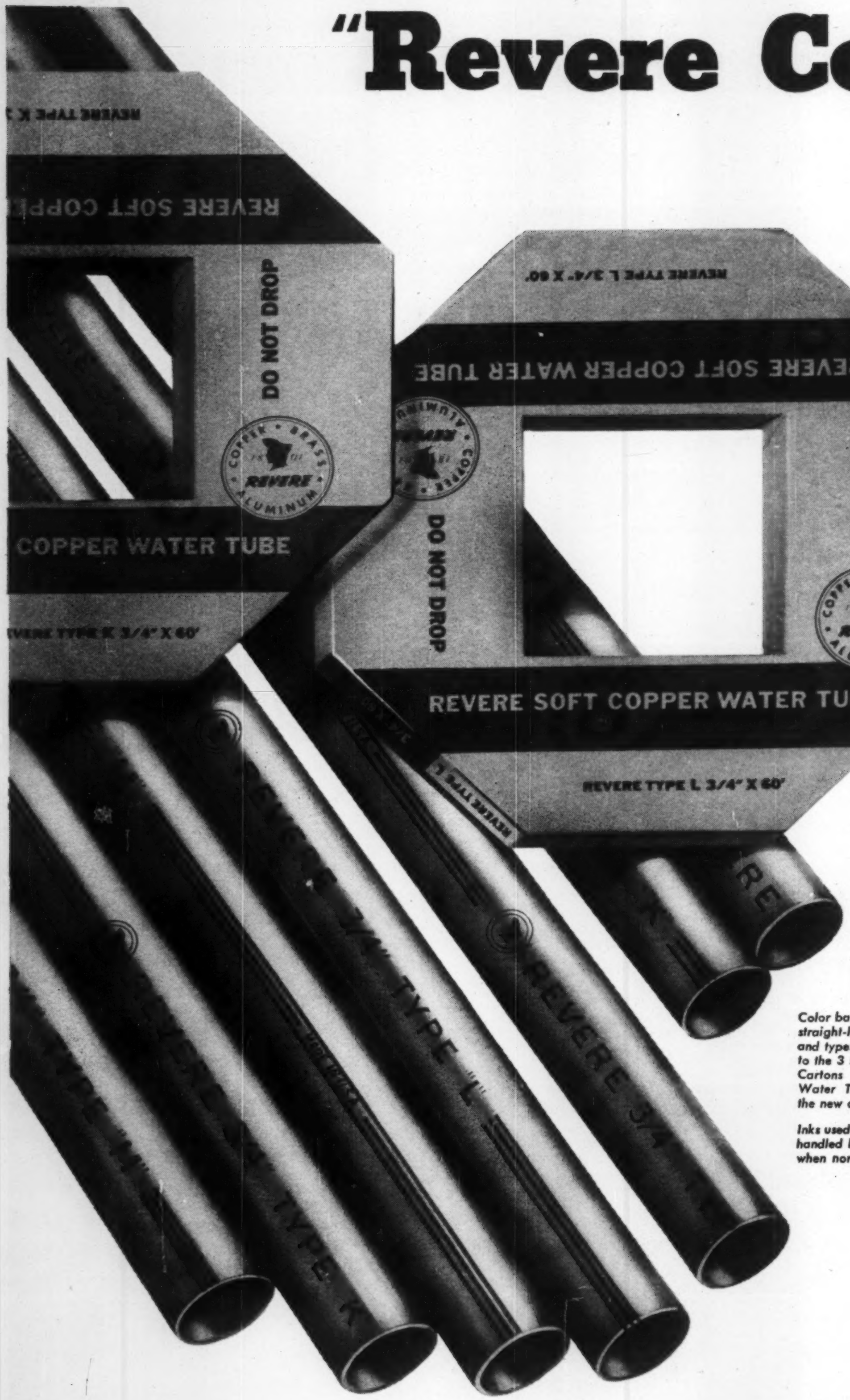
FOR YOUR OWN PROTECTION, SPECIFY "ACCORDING TO AMCA CERTIFIED RATING" FOR STANDARD PRODUCTS COVERED IN THIS PROGRAM

LITHO IN U.S.A.

AIR MOVING & CONDITIONING ASSOCIATION, INC.

2159 GUARDIAN BUILDING
DETROIT 26, MICHIGAN

"Revere Color-


REVERE TYPE K 3/4" X 60'
REVERE SOFT COPPER
COPPER WATER TUBE
DO NOT DROP
COPPER • BRASS • REVERE • ALUMINUM
REVERE TYPE L 3/4" X 60'
REVERE SOFT COPPER WATER TUBE
DO NOT DROP
DO NOT DROP
REVERE SOFT COPPER WATER TUBE
REVERE TYPE L 3/4" X 60'
REVERE TYPE L
REVERE 3/4" TYPE "L"
TYPE K
REVERE 3/4
RE

Color bars run the full length of the 20-foot straight-length tubes, and show tube sizes and types about every 12 inches. In addition to the 3 shown, DWV is color-coded yellow. Cartons in which coiled Revere Copper Water Tube is shipped are stamped with the new color-coding identifications.

Inks used will remain fast while tube is being handled but will not interfere with soldering when normal cleaning procedures are used.

Coding A Big Hit . . .

. . . and a big time and money-saver to us in handling and installing

REVERE COPPER WATER TUBE,"

Says Mr. William R. Geiler, President
GEILER PLUMBING & HEATING CO.,
Cincinnati, Ohio

Continued Mr. Geiler, "From the minute it is delivered Revere Color-Coded Tube starts saving us time and money. In checking bills of lading, shipping tickets and double-checking against building specifications too, there is not only a lot of valuable time saved but there is less chance of mistakes being made. Anyone can spot the different types just by a fast glance. Even in the corners where the light is poor you can tell whether or not the tube being handled is 'K', 'L', 'M' or 'DWV.'

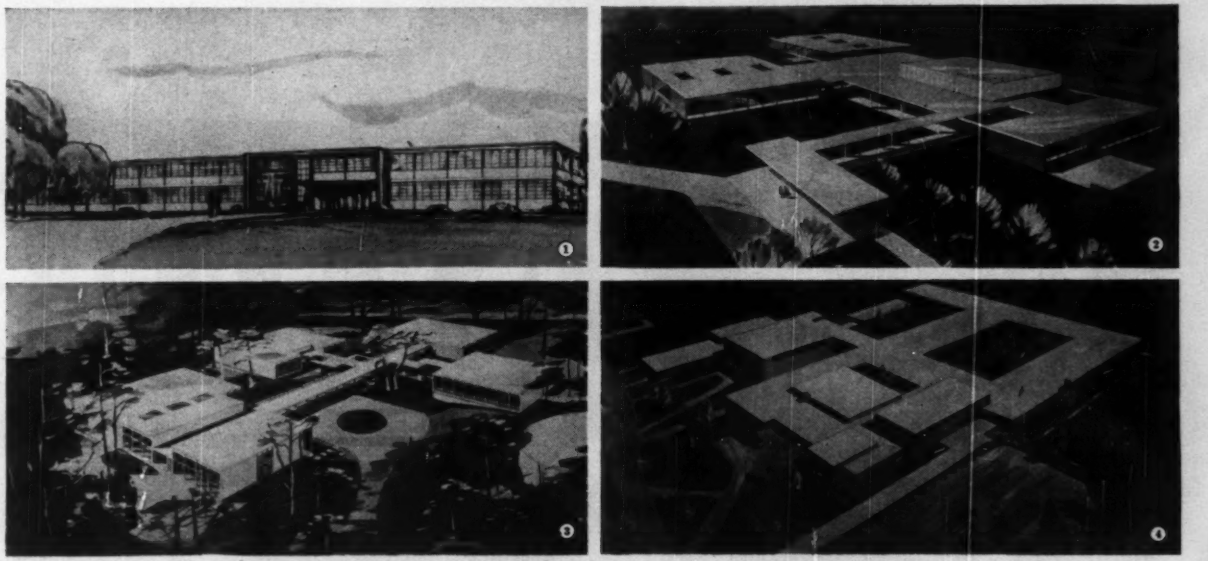
"This Revere color-coding is a wonderful time saver in our shop work and in checking inventories, too. Frankly, I don't know how we've done without this idea as long as we have. It's a real contribution to the plumbing trade. Our men *like* to handle Revere Color-Coded Tube."

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

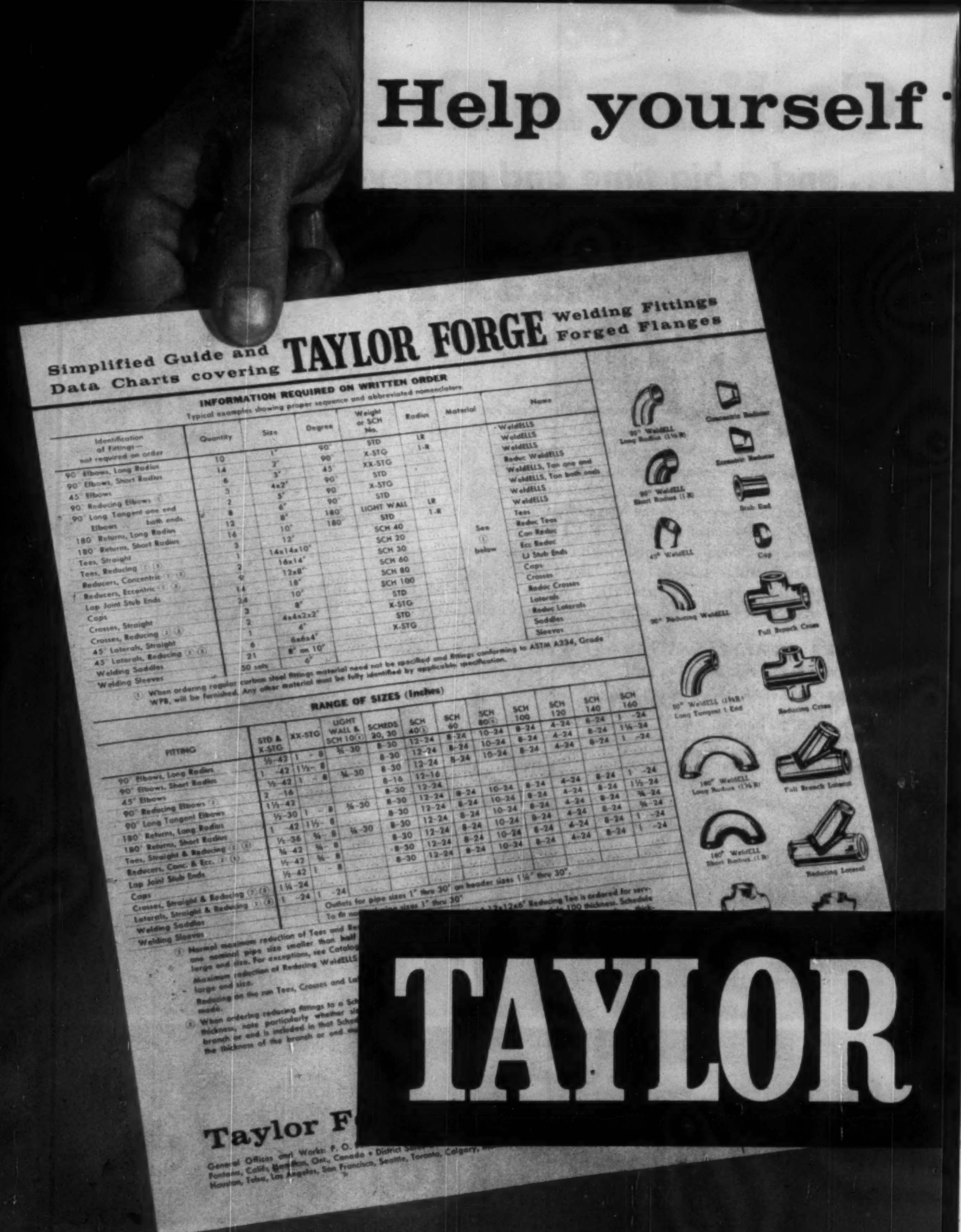
Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

COPPER ★ BRASS ★ 1801 ★ REVERE ★ ALUMINUM



4 OF THE 11 SCHOOLS in which GEILER PLUMBING & HEATING CO., is installing Revere Color-Coded Copper Water Tube, representing a total of some 35,200 feet . . . (1) WILLIAM HENRY HARRISON HIGH SCHOOL, Hamilton County, Ohio. (2) STEWART ELEMENTARY SCHOOL, Sharonville, Ohio. (3) HILLTOP ELEMENTARY SCHOOL, Wyoming, Ohio. (4) OAK HILLS HIGH SCHOOL, Hamilton County, Ohio.

Help yourself


90° WeldELL Long Radius (1½ R)
Concentric Reducer
Eccentric Reducer
90° WeldELL Short Radius (1 R)
Stub End
45° WeldELL
Cap
90° Reducing WeldELL
Full Branch Cross
90° WeldELL (1½R) Long Tangent 1 End
Reducing Cross
180° WeldELL Long Radius (1½ R)
Full Branch Lateral
180° WeldELL Short Radius (1 R)
Reducing Lateral

Simplified Guide and Data Charts covering **TAYLOR FORGE** Welding Fittings Forged Flanges

INFORMATION REQUIRED ON WRITTEN ORDER

Typical examples showing proper sequence and abbreviated nomenclature

Identification of Fittings — not required on order	Quantity	Size	Degree	Weight or SCH No.	Radius	Material	Name
90° Elbows, Long Radius	10	1"	90°	STD	LR	See ① below	WeldELLS
90° Elbows, Short Radius	14	2"	90°	X-STG	1-R		WeldELLS
45° Elbows	6	3"	45°	XX-STG			WeldELLS
90° Reducing Elbows ②	3	4x2"	90°	STD			Reduc WeldELLS
90° Long Tangent Elbows one end	2	5"	90°	X-STG			WeldELLS, Tan one end
both ends	8	6"	90°	STD			WeldELLS, Tan both ends
180° Returns, Long Radius	12	8"	180°	LIGHT WALL	LR		WeldELLS
180° Returns, Short Radius	16	10"	180°	STD	1-R		WeldELLS
Tees, Straight	3	12"		SCH 40			Tees
Tees, Reducing ② ③	1	14x14x10"		SCH 20			Reduc Tees
Reducers, Concentric ② ③	2	16x14"		SCH 30			Con Reduc
Reducers, Eccentric ② ③	9	12x8"		SCH 60			Ecc Reduc
Lap Joint Stub Ends	14	18"		SCH 80			LJ Stub Ends
Caps	24	10"		SCH 100			Caps
Crosses, Straight	3	8"		STD			Crosses
Crosses, Reducing ② ③	2	4x4x2x2"		X-STG			Reduc Crosses
45° Laterals, Straight	1	4"		STD			Laterals
45° Laterals, Reducing ② ③	6	6x6x4"		X-STG			Reduc Laterals
Welding Saddles	21	8" on 10"					Saddles
Welding Sleeves	50 sets	6"					Sleeves

① When ordering regular carbon steel fittings material need not be specified and fittings conforming to ASTM A234, Grade WPB, will be furnished. Any other material must be fully identified by applicable specification.

RANGE OF SIZES (Inches)

FITTING	STD & X-STG	XX-STG	LIGHT WALL & SCH 10④	SCHEDS 20, 30	SCH 40⑤	SCH 60	SCH 80⑥	SCH 100	SCH 120	SCH 140	SCH 160
90° Elbows, Long Radius	½-42	1 - 8	¾-30	8-30	12-24	8-24	10-24	8-24	4-24	8-24	1 -24
90° Elbows, Short Radius	1 -42	1½- 8		8-30	12-24	8-24	10-24	8-24	4-24	8-24	1¼-24
45° Elbows	½-42	1 - 8	¾-30	8-30	12-24	8-24	10-24	8-24	4-24	8-24	1 -24
90° Reducing Elbows ②	2 -16			8-16	12-16						
90° Long Tangent Elbows	1½-42			8-30	12-24						
180° Returns, Long Radius	½-30	1 - 8	¾-30	8-30	12-24	8-24	10-24	8-24	4-24	8-24	1 -24
180° Returns, Short Radius	1 -42	1½- 8		8-30	12-24	8-24	10-24	8-24	4-24	8-24	1½-24
Tees, Straight & Reducing ② ③	½-36	¾- 8	¾-30	8-30	12-24	8-24	10-24	8-24	4-24	8-24	¾-24
Reducers, Conc. & Ecc. ② ③	¾-42	¾- 8		8-30	12-24	8-24	10-24	8-24	4-24	8-24	¾-24
Lap Joint Stub Ends	½-42	¾- 8		8-30	12-24	8-24	10-24	8-24	4-24	8-24	1 -24
Caps	½-42	1 - 8		8-30	12-24	8-24	10-24	8-24	4-24	8-24	1 -24
Crosses, Straight & Reducing ② ③	1¼-24										
Laterals, Straight & Reducing ② ③	1 -24	1 -24									
Welding Saddles			Outlets for pipe sizes 1" thru 30" on header sizes 1¼" thru 30".								
Welding Sleeves			To fit no[illegible]ing sizes 1" thru 30"								

[illegible] 12x12x6" Reducing Tee is ordered for serv-[illegible] 100 thickness. Schedule [illegible] thick-

② Normal maximum reduction of Tees and Re[illegible] one nominal pipe size smaller than half [illegible] large end size. For exceptions, see Catalog [illegible]

Maximum reduction of Reducing WeldELLS [illegible] large end size.

Reducing on the run Tees, Crosses and La[illegible] made.

③ When ordering reducing fittings to a Sch[illegible] thickness, note particularly whether si[illegible] branch or end is included in that Sched[illegible] the thickness of the branch or end mu[illegible]

Taylor F[illegible]

General Offices and Works: P. O. [illegible]
Fontana, Calif., Hamilton, Ont., Canada • District Sa[illegible]
Houston, Tulsa, Los Angeles, San Francisco, Seattle, Toronto, Calgary, [illegible]

TAYLOR

. . . to this helpful
GUIDE AND DATA CHART

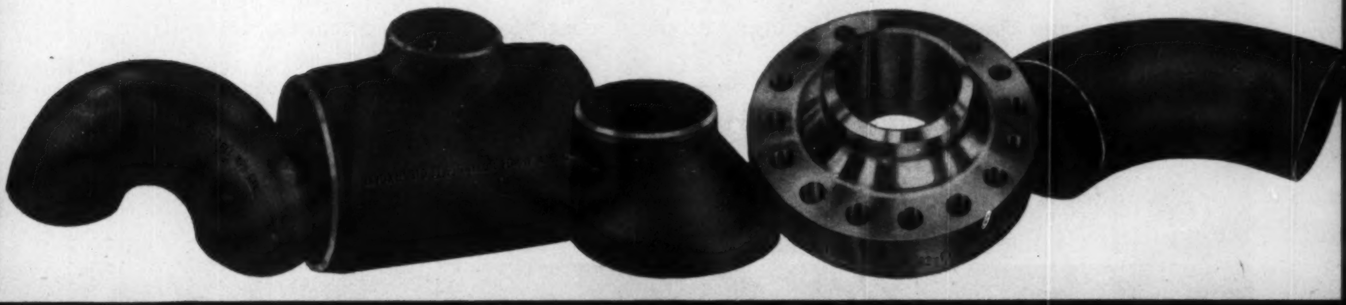
Here's a new Taylor Forge simplified Guide and Data Chart designed to make your job easier. And it's yours for the asking.

Everyone in your organization who is concerned with ordering or specifying welding fittings and flanges will want one of these charts. They're helpful to engineers in preparing bills of material and requisitions. They're invaluable to purchasing personnel in writing up orders and in checking requisitions. Other departments find them time savers in checking incoming material against packing lists or filling orders from warehouse stocks. They save time, prevent errors . . . even expedite shipments by helping prevent omission of needed information.

So . . . be sure to ask for your Guide and Data Chart at once. Your local Taylor Forge Distributor has them and will send or deliver as many as you need. You can also get them from your Taylor Forge District Office or, if you prefer, use the coupon below.

And . . . while you're at it, help yourself to all the other services available through the Taylor Forge Service Network. If you want the latest information on Codes and Standards . . . need quotations in a hurry . . . want order status information or engineering advice . . . whatever your piping problem may be, put the Taylor Forge organization to work. You'll get fast results. For Taylor Forge Distributors, District Offices, Home Office and plants are linked together by telephone and Teletype system . . . a closely knit team of specialists always at your service.

Taylor Forge & Pipe Works, P.O. Box 485, Chicago 90, Illinois. Plants at Carnegie, Pa., Gary, Ind., Houston, Tex., Fontana, Calif., Hamilton, Ont., Canada. District Sales Offices: New York, Boston, Philadelphia, Pittsburgh, Atlanta, Chicago, Houston, Tulsa, Los Angeles, San Francisco, Seattle, Toronto, Calgary, Montreal.



FORGE Welding Fittings and Forged Flanges

Taylor Forge & Pipe Works, P.O. Box 485, Chicago 90, Illinois
Your new Guide and Data Chart should be very helpful. Please send me ______ copies without charge.

Name____________________ Title____________________

Firm____________________ Address____________________

City____________________ Zone______ State__________

QUIET, RELIABLE INSTALLATIONS WITH "BUFFALO" AIR CONDITIONING CABINETS

Space-Saving, Efficient, Dependable

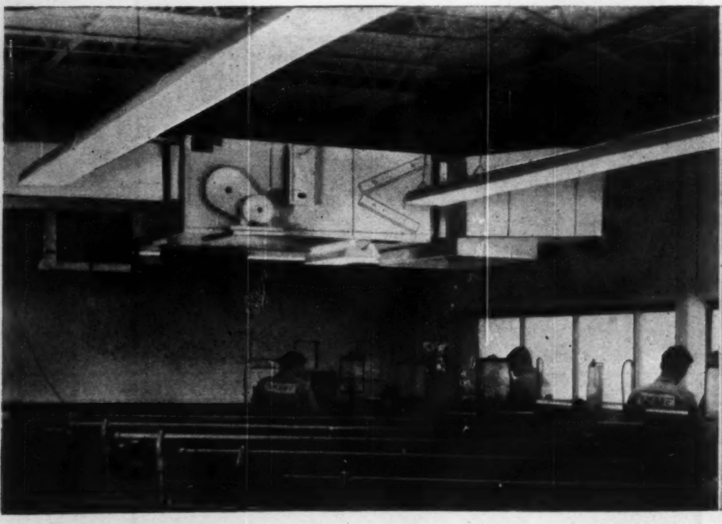
Leading engineers and contractors rely on "Buffalo" Air Conditioning Cabinets to insure superior *on-the-job satisfaction* for their industrial, commercial and institutional installations. Here are a few good reasons why:

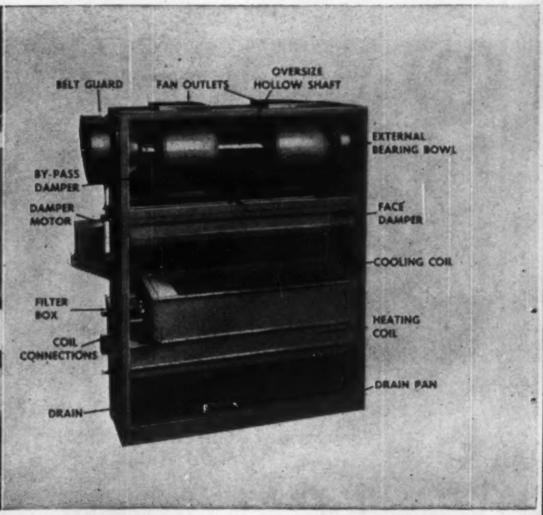
EASILY-INSTALLED — Knocked-down "panel" construction provides easy passage through existing openings and quick, low-cost assembly in the field. Makes maintenance easy.

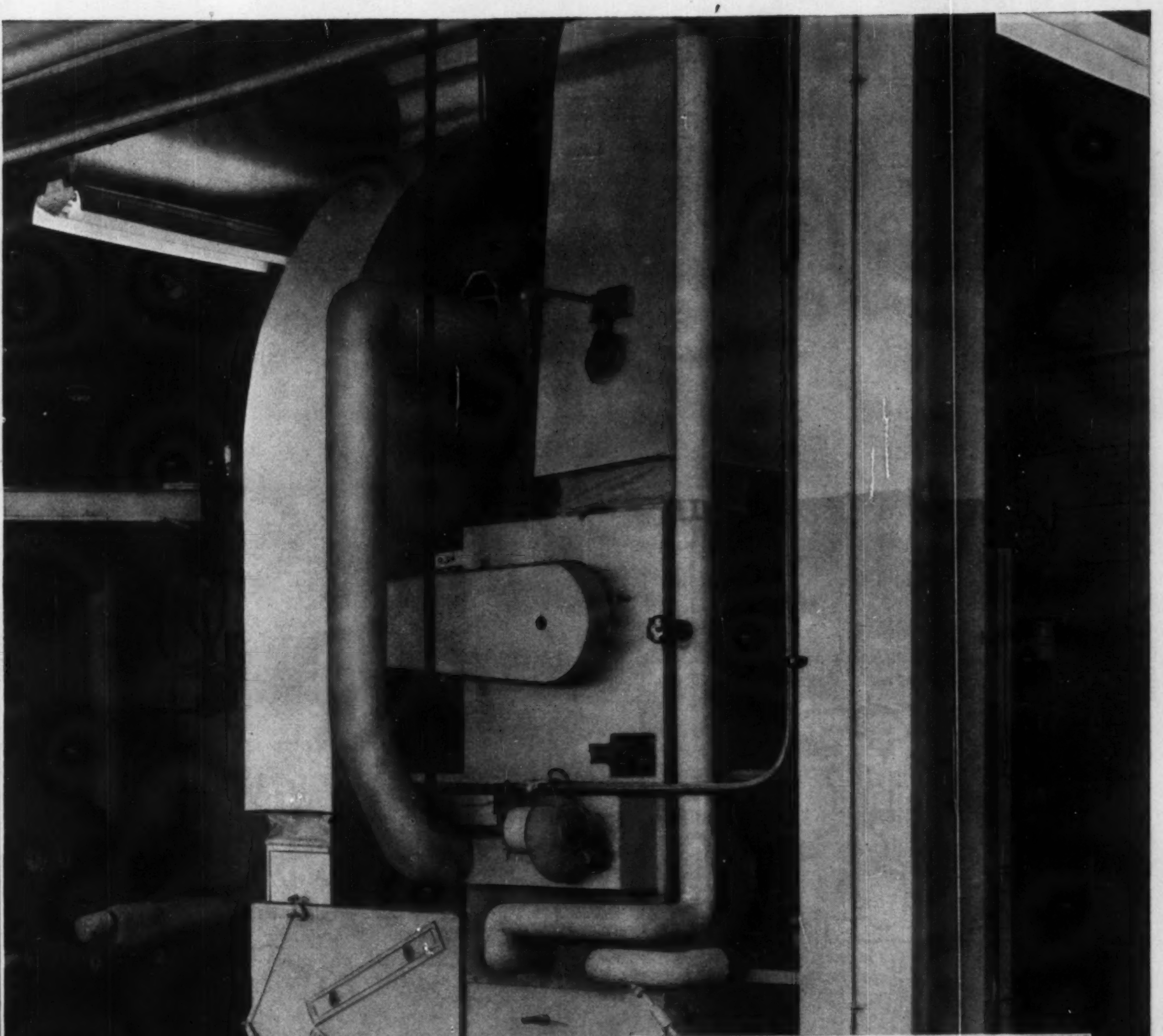
CUSTOMER SATISFACTION ASSURED — Economical to operate and attractive in appearance, these quiet, efficient, space-saving units afford a long life of minimum-maintenance performance.

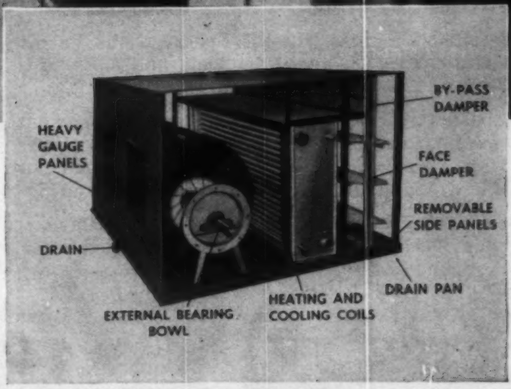
A DESIGN FOR EVERY NEED — "Buffalo" offers a full line of Air Conditioning Cabinets. Units are available in combinations suitable for simple cooling or full air conditioning — including summer cooling and dehumidifying, winter heating and humidifying and continuous air cleaning. Automatic controls can be specified. Capacities from 875 to 22,000 cfm.

To insure satisfaction on *your* next air conditioning job, call in your nearby "Buffalo" Engineering Representative. He'll be glad to help you in every possible way. Or, write us direct for Bulletin AC-120.




BELT GUARD
FAN OUTLETS
OVERSIZE HOLLOW SHAFT
EXTERNAL BEARING BOWL
BY-PASS DAMPER
DAMPER MOTOR
FACE DAMPER
COOLING COIL
FILTER BOX
HEATING COIL
COIL CONNECTIONS
DRAIN PAN
DRAIN




HEAVY GAUGE PANELS
DRAIN
EXTERNAL BEARING BOWL
HEATING AND COOLING COILS
DRAIN PAN
REMOVABLE SIDE PANELS
FACE DAMPER
BY-PASS DAMPER

Right: Sectionalized View of "Buffalo" Type "PC" Horizontal Air Conditioning Cabinet.

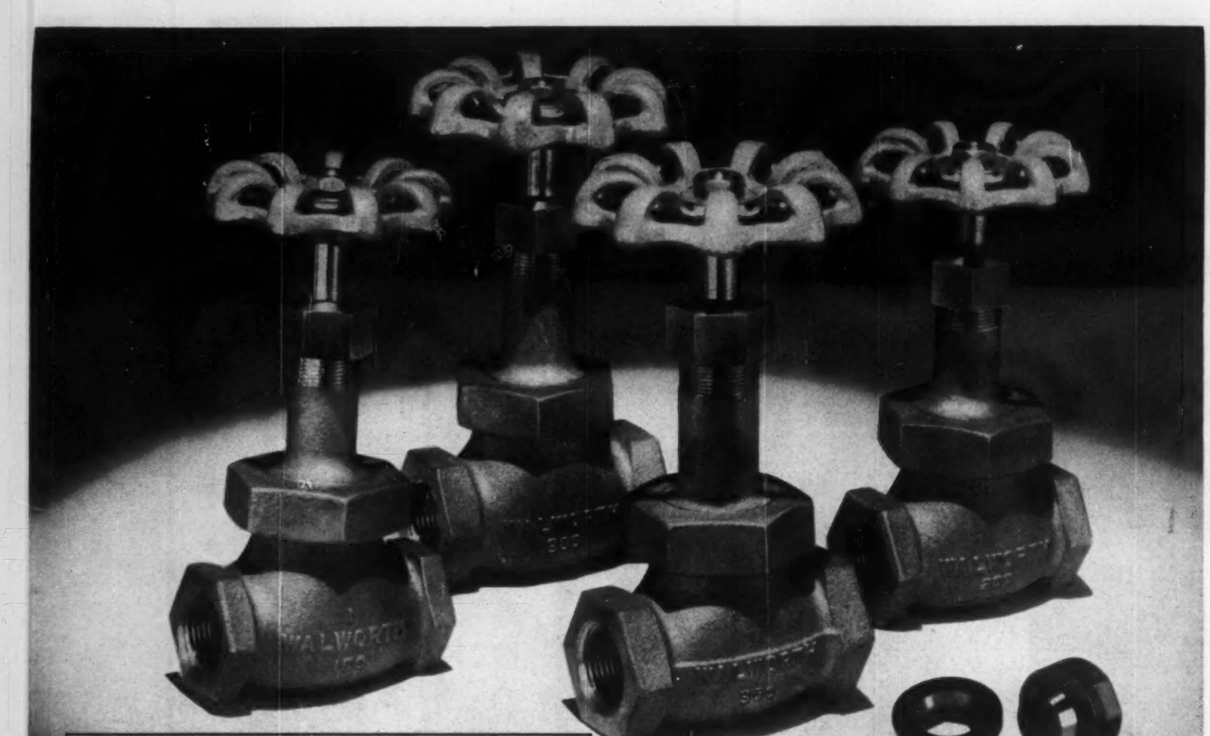
Left: "Buffalo" Type "VPC" Vertical Air Conditioning Cabinet with Front Panels Removed.

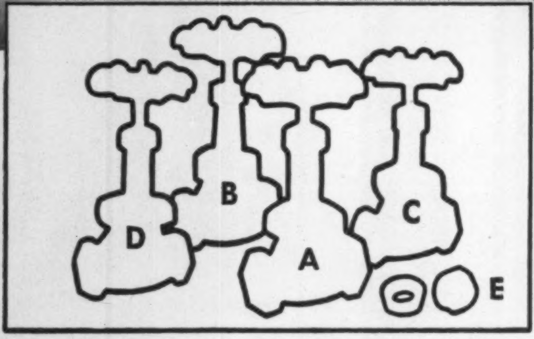
On-the-job satisfaction is assured by the famous "Q" Factor—the built-in QUALITY that provides trouble-free satisfaction and long life in every "Buffalo" product.

"Buffalo"

BUFFALO FORGE COMPANY
BUFFALO, NEW YORK
BUFFALO PUMPS DIVISION, BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING





A — No. 225P............350 WSP 550F, 1000 WOG
B — No. 260P............300 WSP 550F, 600 WOG
C — No. 245P............200 WSP 550F, 400 WOG
D — No. 237P............150 WSP 500F, 300 WOG
E — "500 Brinell" Stainless Steel Plug Type Seat and Disc

Walworth offers four lines of Bronze Globe Valves with stainless steel, plug-type seats and discs. Advantages of these valves include:

- **Stainless Steel Plug-Type Seats and Discs,** heat-treated to a minimum of 500 Brinell hardness reduces wire-drawing to a minimum. Seats and Discs are machined and fitted simultaneously, assuring perfect mating.
- **Deep Stuffing Boxes with Glands** are fitted with reinforced, molded packing. Valves can be repacked under pressure when fully opened.

For Longer Bronze Valve Life . . .

"500 BRINELL" PLUG-TYPE STAINLESS STEEL SEATS AND DISCS

150 lb. 200 lb. 300 lb. 350 lb.

- **Oversize Stems,** made of high tensile strength silicon-bronze, assure long life.
- **Rugged Body Hexes,** are flat on top; do not interfere with wrench gripping body-to-bonnet union ring connection.
- **Bodies,** made of Composition M bronze (ASTM B61), have ample wall thickness to provide high safety factor.
- **Patented Handwheels** are air-cooled and designed with a "finger-fit grip." Makes turning easy even when wearing greasy gloves.
- **Identification Plates** secured by lock-washer under stem nut, show Figure Number of valves and make re-ordering sure and easy.

***FOR COMPLETE INFORMATION,** SEE YOUR WALWORTH DISTRIBUTOR OR WRITE FOR ILLUSTRATED CIRCULAR*

WALWORTH

60 East 42nd Street, New York 17, New York

SUBSIDIARIES: ALLOY STEEL PRODUCTS CO. CONOFLOW CORPORATION M & H VALVE & FITTINGS CO.
SOUTHWEST FABRICATING & WELDING CO., INC. WALWORTH COMPANY OF CANADA, LTD.

Buensod pioneered and introduced proper controls for Dual-Duct Air Conditioning. Inherently, such systems have unstable pressures—yet provide the greatest flexibility of control for the occupants. So the problem was to make . . .

a STABLE dual-duct system

Buensod does it automatically and without a sensing instrument or complicated electronic device. This is DIRECT, AUTOMATIC VOLUME CONTROL. No matter what the variance in static pressures, a constant quantity of air is maintained in each unit. This makes it *impossible to unbalance any zone in the system.*

And it's so simple. A screw setting of spring tension at the time of installation and the unit need never be touched again. If after installation, a change of air volume in a particular zone is desired, it can be made quickly by adjusting one nut. When desired, volume adjustment can be pre-set at the factory by calibrated flow meters, eliminating the need for field adjustment. This, in effect, balances the entire system without necessity of a field check and re-balancing.

Compressed air from a local thermostat controls the mixing valve. No linkage. No pivot points. The valve has been designed for direct, straight-line movement.

Whether you're working on a new building or a renovation, Buensod Dual-Duct air mixing units will do the job and do it best, and one of the reasons is

DIRECT, AUTOMATIC VOLUME CONTROL

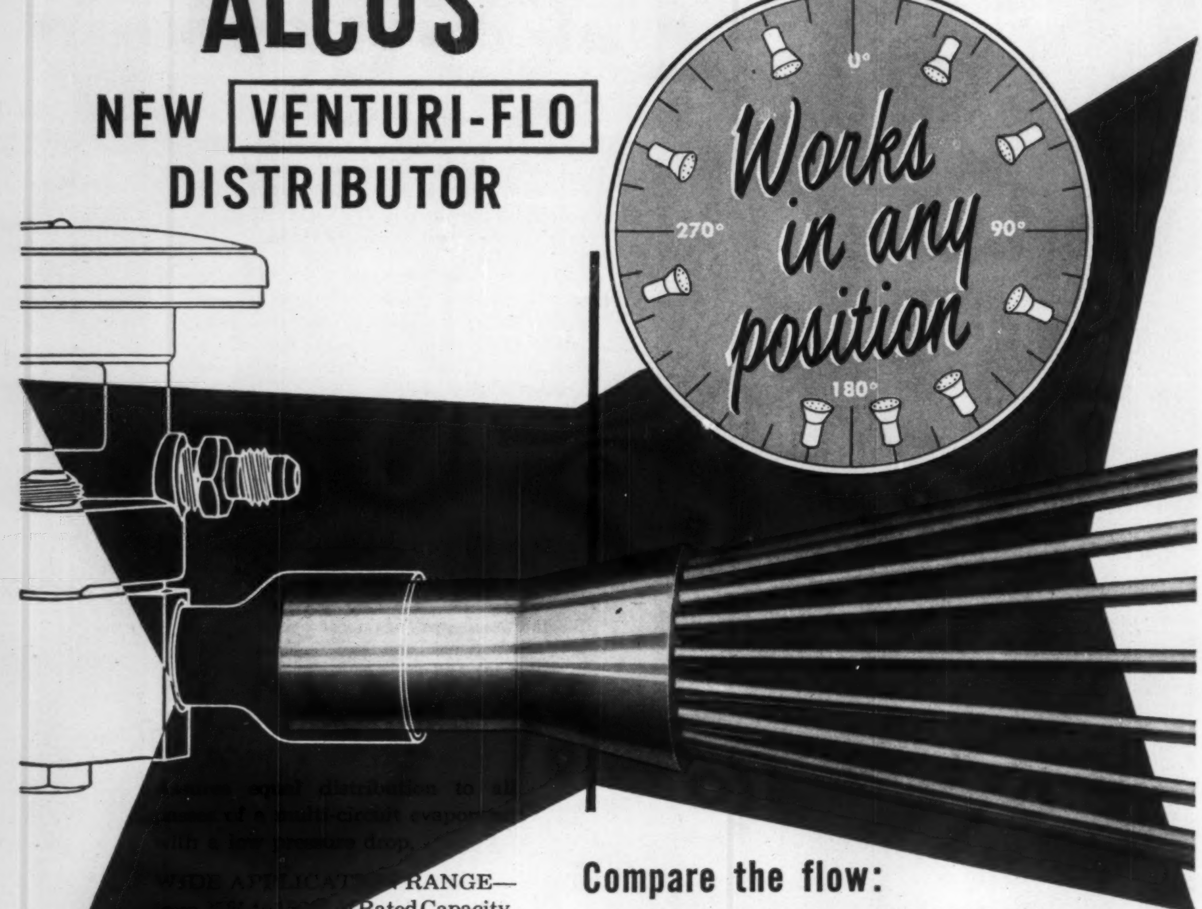
For further information and complete specifications, see your local Buensod representative or contact us.

BUENSOD-STACEY, Inc.
45 West 18 Street, New York 11, N. Y

BUENSOD-STACEY
INCORPORATED

CHECK THE ADVANTAGES...THEN SPECIFY • INSTALL

ALCO'S
NEW VENTURI-FLO DISTRIBUTOR


Works in any position
0°
90°
180°
270°

Assures equal distribution to all passes of a multi-circuit evaporator with a low pressure drop.

WIDE APPLICATION RANGE—from [illegible] to [illegible] of Rated Capacity.

LOW PRESSURE DROP—permits [illegible], more economical Thermo® Valve sizing—assures more stable valve control.

ONE PIECE CONSTRUCTION—nothing to come apart, nothing to take apart—*No orifices, plates or nozzles needed* for capacity regulation.

Compare the flow:

FIG. #1 – FLOW THRU AN ORIFICE PLATE
No Pressure Recovery — High Pressure Drop

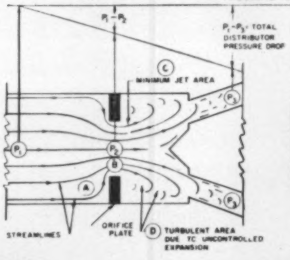
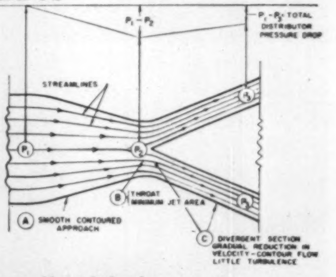

PRESSURE DATUM LINE
$P_1 - P_2$
$P_1 - P_3$ = TOTAL DISTRIBUTOR PRESSURE DROP
C MINIMUM JET AREA
P_1
P_2
P_3
B
A
STREAMLINES
ORIFICE PLATE
D TURBULENT AREA DUE TO UNCONTROLLED EXPANSION

FIG. #2 – FLOW THRU A VENTURI
Pressure Recovery — Low Pressure Drop


$P_1 - P_2$
$P_1 - P_3$ = TOTAL DISTRIBUTOR PRESSURE DROP
STREAMLINES
P_1
P_2
P_3
B THROAT MINIMUM JET AREA
A SMOOTH CONTOURED APPROACH
C DIVERGENT SECTION GRADUAL REDUCTION IN VELOCITY – CONTOUR FLOW LITTLE TURBULENCE

**Call your Alco wholesaler—
write for Specifications Bulletin No. 188-57.**

ALCO

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• BUY QUALITY
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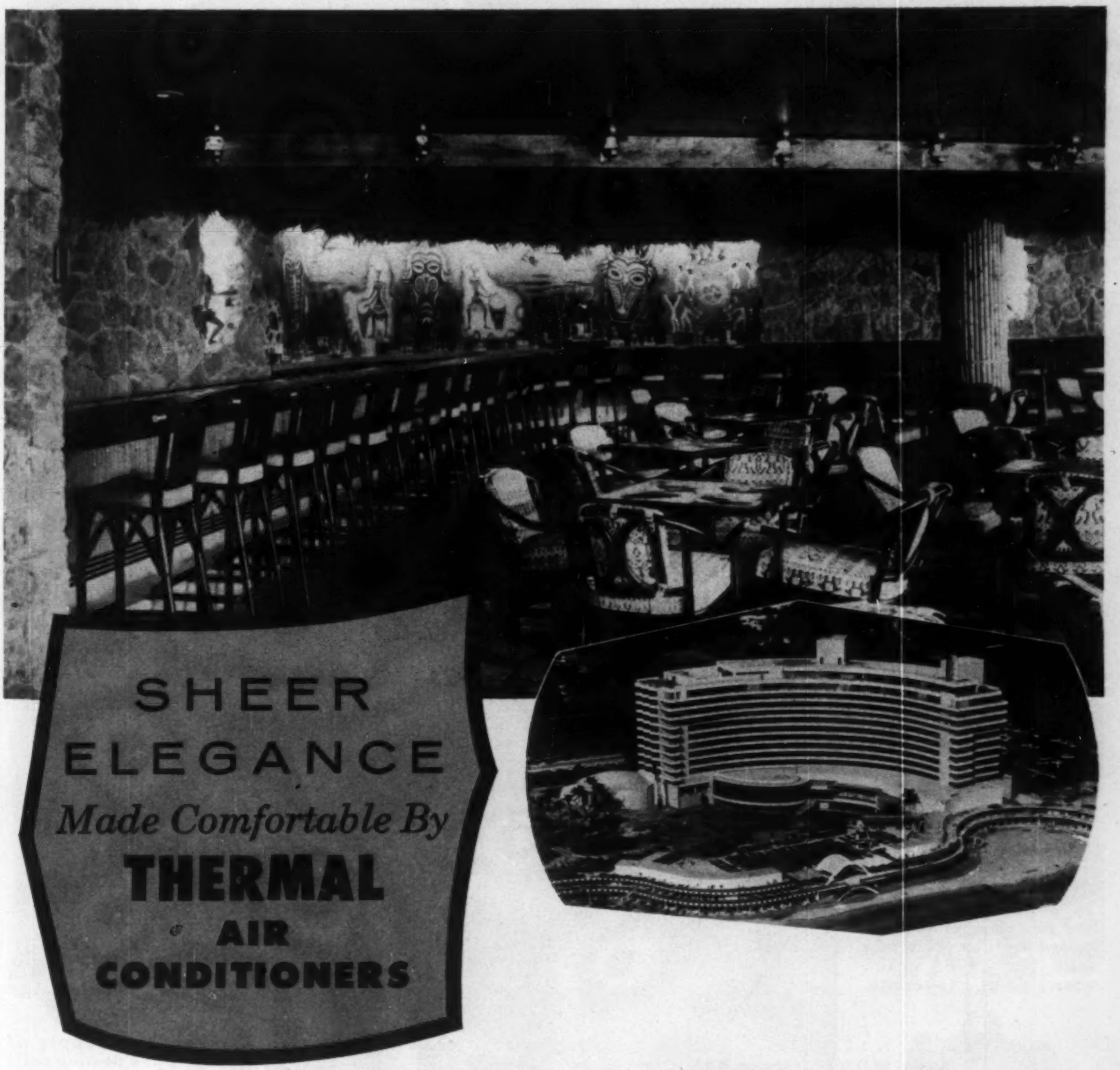
7810

ALCO VALVE CO.
861 KINGSLAND AVE. • ST. LOUIS 5, MO.

The one complete line of refrigerant controls: Thermostatic Expansion Valves • Refrigerant Distributors Solenoid Valves • Suction Line Regulators • Flooded Evaporator Controls and Reversing Valves



The stylish and highly fashionable Rose Room and Boom Boom Room of Miami Beach's beautiful Hotel Fontainebleau* are maintained in perfect year around comfort with quiet, dependable Thermal Engineering air conditioning units. Fully automatic, the installation maintains pleasing climate, regardless of the size of the crowd.

Thermal Engineering Corporation manufactures a quality line of air conditioning equipment for every type building. The Thermal line includes central plant air conditioners; multizone air conditioners; sprayed coil units; heating and ventilating units; cooling and heating coils and air-cooled condensers. Write for complete information and specifications.

Agents in principal cities.

*Architect:
Morris Lapidus, Miami Beach, Fla.
Air Conditioning Contractors:
Hill York Corporation, Miami, Fla.

Quality Products Since 1945
THERMAL ENGINEERING CORPORATION
2605 W. DALLAS • P. O. BOX 13254
HOUSTON 19, TEXAS

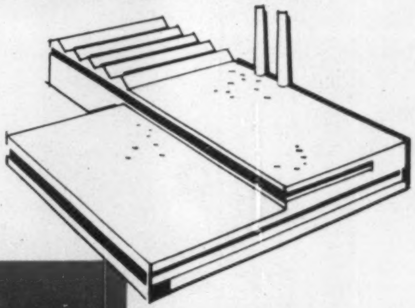
HOFFMAN STEAM SPECIALTIES

Designed and Engineered to Meet Industry's Needs

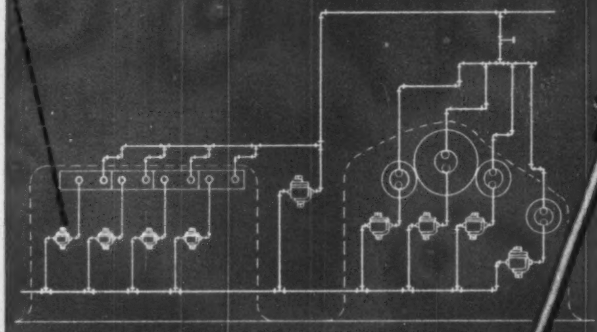
- Heating Systems
- Manufacturing
- Processing

600 SERIES INVERTED BUCKET TRAP

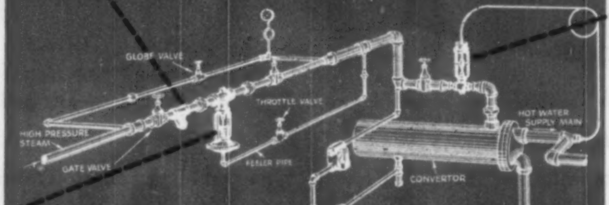
For draining condensate and air from equipment such as: steam cookers, steam heated vats in process work, unit heaters, steam coils, pressers, corrugated paper making machines and for lifting condensate to overhead return mains.



TYPICAL APPLICATIONS



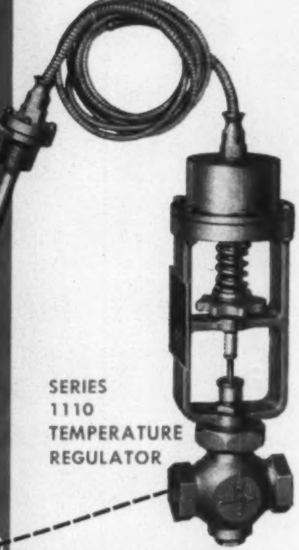
Draining Corrugated Paper Making Machine



Converter for Heating Water with High Pressure Steam

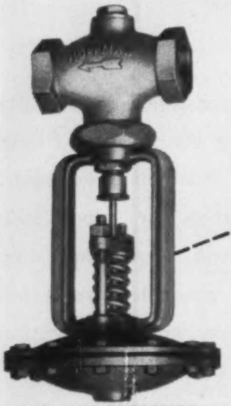
400 SERIES DIRT STRAINER

To protect valves, traps and pumps from damage caused by dirt, rust and scale. For use on steam, water, oil or gas service.



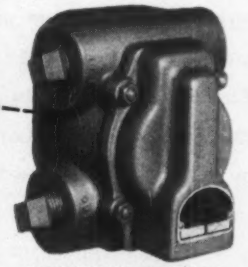
SERIES 1110 TEMPERATURE REGULATOR

To regulate supply of steam to the heating coils in converters, cookers, processing tanks, sterilizers and water heaters.



NO. 710 PRESSURE REDUCING VALVE

To reduce the pressure of fluids from a higher initial pressure to a lower second pressure. Designed to meet varying requirements necessary to control fluids, such as steam, air, oil or gas.



50 SERIES F & T TRAP

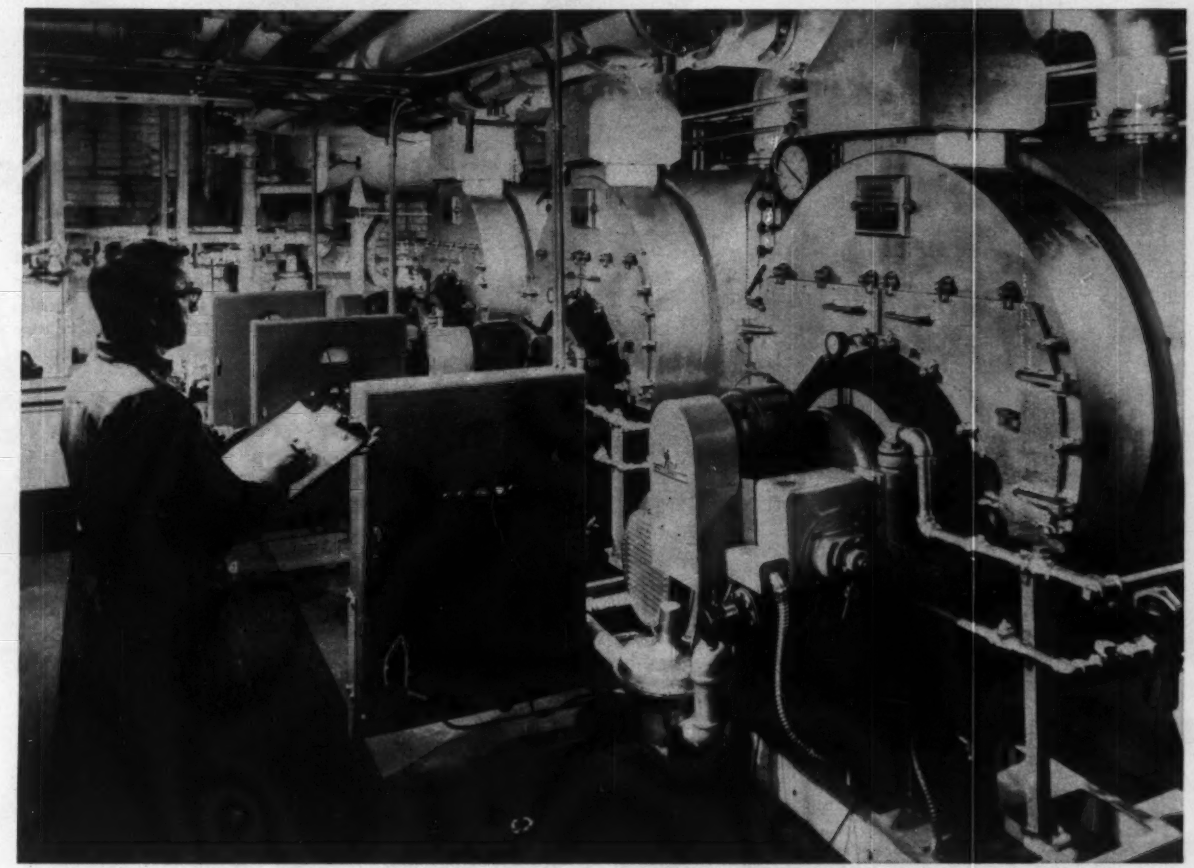
To release condensate and air and to prevent release of steam in steam systems. Extremely quiet in operation therefore, ideal for schools, hospitals, churches, offices and apartments.

GUARDIAN OF YOUR HEALTH AND COMFORT

HOFFMAN
SPECIALTY MFG. CORP.
1700 West 10th Street, Indianapolis 7, Indiana

The smart way to modernize

. . . specify your heating plant in one package



This remodeled boiler room serves the two buildings of the Columbus Dispatch newspaper plant, Columbus, Ohio. Fuels can be quickly changed in these three Iron Fireman-Kewanee gas-oil boiler-burner units. Consulting Engineers, John Paul Jones, Cary & Millar, Cleveland; Architect, Dan A. Carmichael, Columbus; Heating Contractor, Limbach Co., Columbus.

Iron Fireman burner with boiler — engineered as a single unit

These famous boiler-burner units are the products of two great specialists—each in its own field. They are engineered for each other. Included in one catalog, they can be ordered by a single model number from one set of specifications.

Plenty of reserve power

You can feel *safe* in specifying Iron Fireman equipment. These thoroughly engineered units are conservatively rated. The normal firing rate is a comfortable cruising speed—less strain, low maintenance, quiet operation, higher efficiency—and that big extra capacity is always standing by to pick up extra loads.

Compact and complete

These complete steam or hot water generating units require little more than service connections. Automatic controls, air and fuel systems are built in. No special boiler settings; low headroom; no high stack.

Please mail coupon for catalog and specifications.

IRON FIREMAN®

AUTOMATIC FIRING EQUIPMENT
FOR OIL, GAS, COAL

IRON FIREMAN MANUFACTURING CO.
3080 West 106th Street, Cleveland 11, Ohio
(In Canada, 80 Ward Street, Toronto, Ontario)

Please send catalog and specifications on following equipment:

☐ Complete boiler-burner units
☐ Forced draft firing unit only

Name____________________

Firm____________________

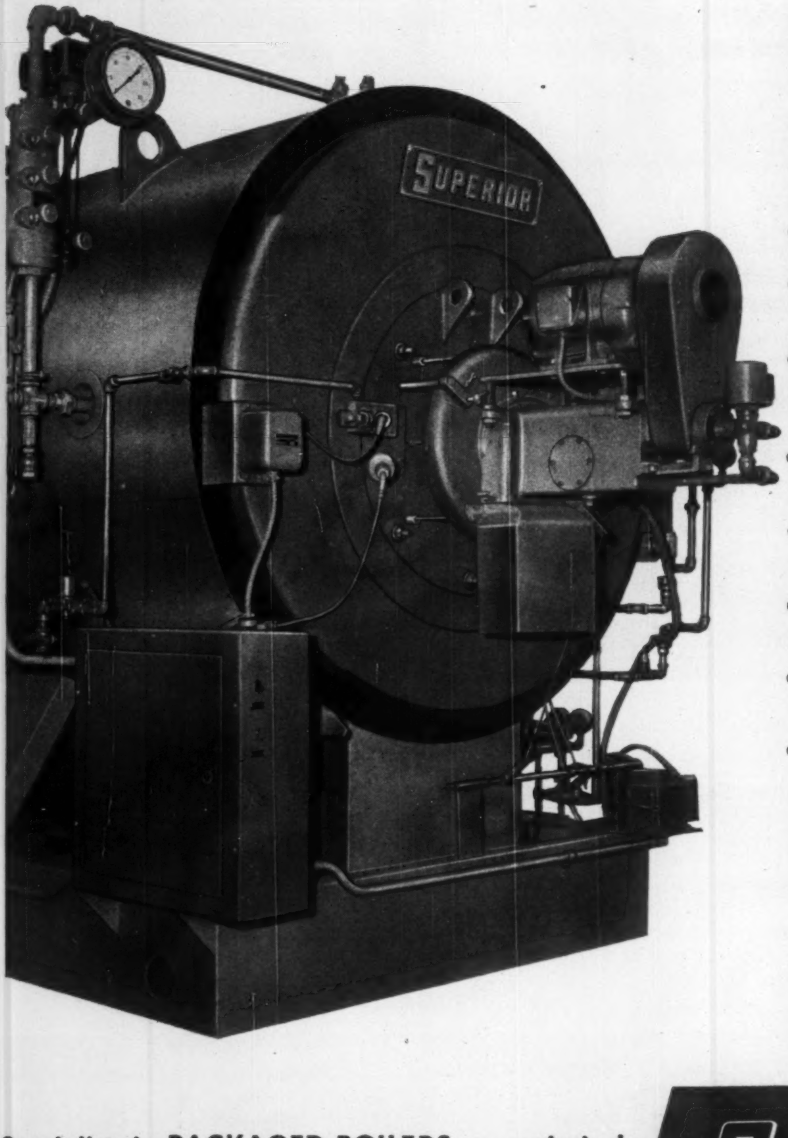
Address____________________

City____________State________

a completely packaged boiler
for capacities from 20 to 200 b.h.p.

SUPERIOR "COMPACT"

compact . . . but with no concession to dependability.



The Superior COMPACT boiler combines reduced over-all dimensions with rugged, practical boiler construction.

Completely packaged and factory fire-tested, the COMPACT is equipped with a dependable Superior Rotary Burner, and has its own quiet, safe, built-in induced draft fan. Compare these COMPACT features with any other boiler in the same capacity range.

- Full 5 sq. ft. of heating surface per boiler horsepower for maximum heat transfer.
- 4-pass down draft design for high velocity gas travel and better water circulation.
- Fully automatic; firing oil, gas or both. Dependable rotary burner reduces maintenance and supervision. Insures fuel economy.
- Smaller outside dimensions allows installation in short or narrow spaces or where overhead is restricted.
- Ample clearance under drum allows easy access for installation and inspection of piping.
- Hinged or davited front and rear provides quick, easy access to tube banks for cleaning or inspection.
- Completely insulated and jacketed. Insulation extends all the way round the main drum.
- High furnace, separated from bottom of boiler by tubes of fourth pass, is safely away from "danger zone" completely eliminating bagging and blistering of furnace which results when mud builds up between bottom of boiler and furnace.

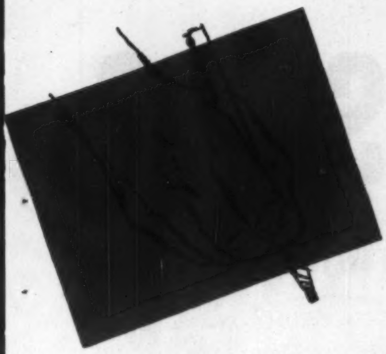
11 sizes from 20 to 200 b.h.p. for pressures to 250 p.s.i. or for hot water operation. Other Superior fire tube units are manufactured in capacities to 600 b.h.p.

Write today for Bulletin 1004C

Specialists in PACKAGED BOILERS . . . exclusively

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR
PACKAGED BOILERS



HOWEVER YOU WRITE IT, BE SURE TO SPELL IT

Reading Copper Tube

The fact that Reading Tube is second to none in quality is not the only reason contractors keep *reordering* it. The big plus is the "Shirt-Sleeve Service" that accompanies this fine product. At the Reading plant, every executive personally follows up the individual needs of distributors and their contractor accounts. Their efforts are backed by Reading Depots thruout the U.S., stocked to meet any shipping emergency.

Preserve your peace of mind and your customer good will by specifying Reading when you order copper tube. Then, you can count on getting *exactly* what you want — *exactly* when you want it!

BUY READING TUBE— MADE IN AMERICA

On "Shirt-Sleeve Service" You Can Rely If READING Tube You Specify!

READING TUBE CORPORATION

Empire State Building, New York 1, N. Y. • Plant: Reading, Pa.

Distribution Depots:

READING, PA.

WOODSIDE, L.I., N.Y.
57-17 Northern Blvd.

PHILADELPHIA, PA.
921 Penn St.

CHICAGO, ILL.
724 W. 50th St.

CLEVELAND, OHIO
4615 Perkins Ave.

ATLANTA, GA.
690 Murphy Ave.
S.W., Unit 5, Bldg. B

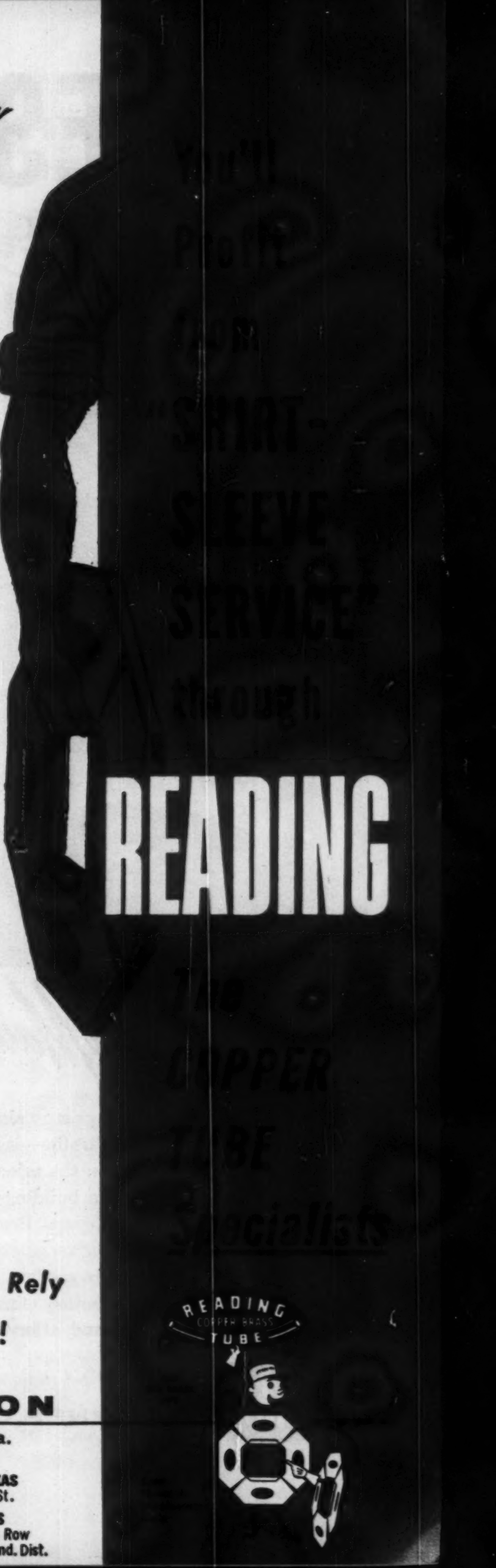
DENVER, COLO.
2845 Walnut St.

LOS ANGELES, CALIF.
120 No. Santa Fe Ave.

OAKLAND, CALIF.
410 Hegenberger Road

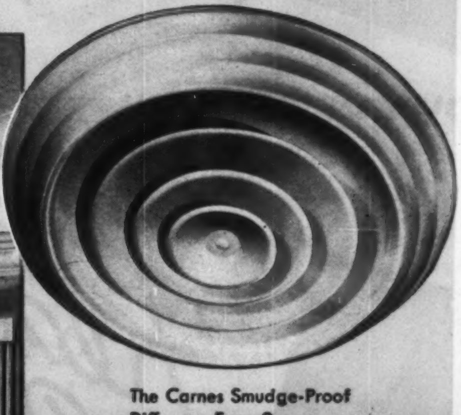
HOUSTON, TEXAS
1121 Rothwell St.

DALLAS, TEXAS
9000 Sovereign Row
Brook Hollow Ind. Dist.



CARNES DIFFUSERS

Beautify the New Eden Roc at Miami Beach



The Carnes Smudge-Proof Diffuser—Form 2

Contractor: **HILL YORK CORP., Miami, Florida**
Architect: **MORRIS LAPIDUS, Miami, Florida**

and afford Low Maintenance too!

How to make ceilings stay cleaner, longer—in lobbies with heavy traffic—is becoming of increasing importance in the selection of ceiling diffusers for today's buildings of beauty.

The Eden Roc at Miami Beach installed *Carnes Smudge-Proof Diffusers, Form 2.* These Carnes diffusers are designed to the specific depth in each size to definitely eliminate ceiling smudging and aging, and affording substantial savings in ceiling maintenance.

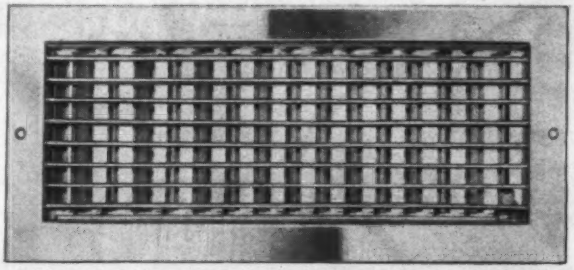
Carnes Form 2 Diffusers offer top performance, beauty of design, and air pattern adjustability. Form 2 is available in both Model EJ adjustable diffuser, and Model E fixed cone diffuser. Equipped with a radial type damper, Form 2 Diffuser evenly distributes primary air in a truly radial pattern. Write for complete information given in Carnes Catalog No. 56.

CARNES®

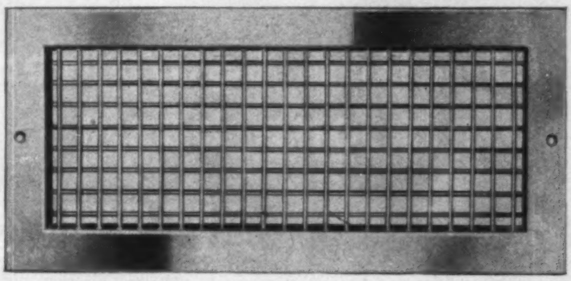
CARNES CORPORATION • Verona, Wisconsin

THERE'S GOOD REASON WHY MORE AND MORE SPECIFICATIONS CALL FOR

CARNES REGISTERS and GRILLES



REGISTERS
by CARNES



GRILLES
by CARNES

A COMPLETE LINE

There's a Carnes Register or Grille to meet every requirement—a complete range of models and sizes! All are available in either steel, aluminum or stainless steel, and equipped with streamlined hollow blades. Carnes Registers can be furnished with either an opposed blade damper or a multiblade damper, both face operated. The Carnes line features quality with economy.

SUPERIOR FINISH

Carnes Registers and Grilles feature *matching finishes* that add beauty to any interior! It's the F-4, the *permanent finish*—a metalescent aluminum baked enamel. Carnes F-4* is called "the finish of permanent beauty"!

EASE OF CLEANING due to design

The quality finish on Carnes Registers and Grilles *eliminates needless interior decorating expense.* The baked-on enamel is exceptionally easy to clean—all that is necessary is a washing with soap and water—and the original "new" appearance is restored!

*** All Carnes Registers and Grilles—with the exception of punched lattice grilles and registers, and door grilles—are finished in F-4 as standard.**

Write for Bulletin...

Descriptions, specifications and performance data on the complete line of Carnes Registers and Grilles is contained in the Carnes Catalog 76D. A copy can be obtained for the asking—write Carnes Corporation, Verona, Wisconsin.

CARNES
REGISTERS
GRILLES
VOLUME CONTROL DAMPERS

CARNES

CARNES CORPORATION **Verona, Wisconsin**

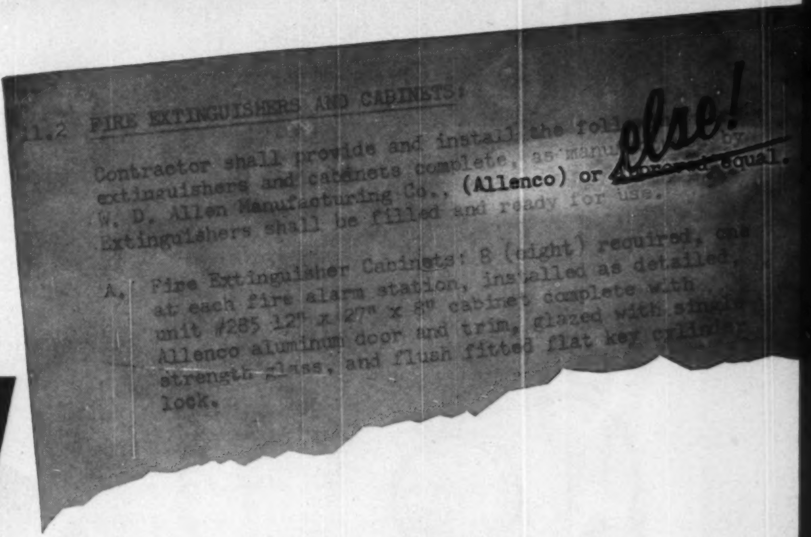
your job* calls for the best
and...
in
Fire Protection Equipment
there's only one best:
ALLENCO

*Commercial and Public Buildings, Hotels, Hospitals, Schools, Churches, Multi-Unit Residential Buildings

See why ALLENCO leads year-in and year-out . . .

- Ask architects, engineers, contractors or fire authorities
- Check Sweet's or Domestic Engineering catalog directory
- Write for your own copy of Catalog 150—A.I.A. file 29e2

ALLENCO
FIRE PROTECTION
W. D. ALLEN



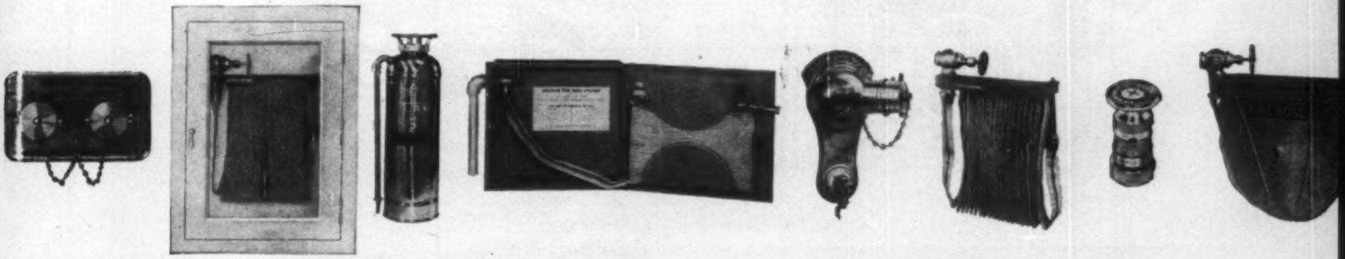
1.2 FIRE EXTINGUISHERS AND CABINETS:

Contractor shall provide and install the fol by
extinguishers and cabinets complete, as manu
W. D. Allen Manufacturing Co., (Allenco) or ~~Approved~~ equal.
Extinguishers shall be filled and ready for use.

A. Fire Extinguisher Cabinets: 8 (eight) required, one
at each fire alarm station, installed as detailed,
unit #285 12" x 27" x 8" cabinet complete with
Allenco aluminum door and trim, glazed with single
strength glass, and flush fitted flat key cylinder
lock.

best for *specifying

- Wide selection to meet *any* requirement of code or insurance, structure or design, owner's operation or budget
- Detailed data *and* ready-to-copy standard specs in catalog form and also from nearby, reliable Fieldmen
- Best known *name*, thoroughly backed by manufacturer



best for *installing

- No delays: prompt quotes; accurate rough-in data; delivery on time *and* as specified
- Lower costs: competitively priced; goes in faster, needs no more work
- Reliable: on-the-job help as needed; lasting good looks and service

ALLENCO
FIRE PROTECTION
W. D. ALLEN

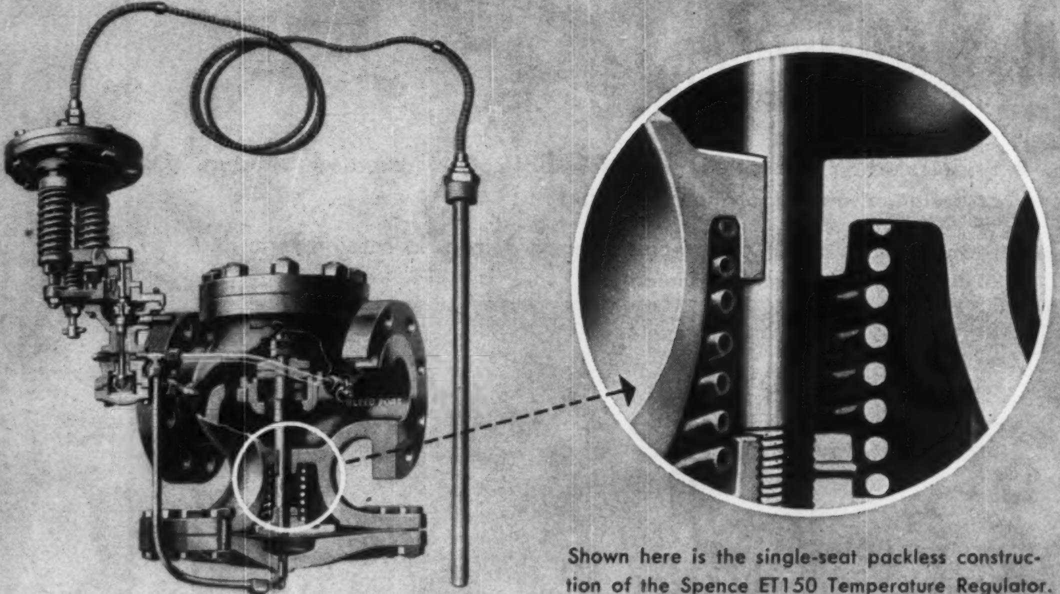
*Write for catalog, or phone your Allenco Fieldman listed in Yellow Pages.

SINCE 1889

W. D. ALLEN MANUFACTURING CO.
ROOM 500, ALLENCO BLDG., 566 W. LAKE ST., CHICAGO 6, ILL.

VALVE TIPS:

Advantages of Packless Construction in Temperature Regulating Valves



Shown here is the single-seat packless construction of the Spence ET150 Temperature Regulator.

One of the biggest headaches in regulating valve maintenance is repacking stuffing boxes.

How often a valve needs repacking, how much time it takes, and the cost of the system downtime all vary with the construction of the regulator and the service it's used for. No matter how you calculate all these variables it's still a headache—and an expensive one.

In the temperature regulator shown above (Spence Type ET150) stuffing boxes are eliminated. This is done by what is known as "balanced" diaphragm construction. You can see in the cutaway drawing that pressure is applied to both sides of the large metal diaphragm. The upper side is exposed to delivery steam pressure and the lower side is exposed to loading pressure applied by the pilot. When the pilot closes, both delivery pressure and loading pressure are equalized through the bleedport and connecting tubing.

This construction not only does away with repacking problems, but it makes possible additional savings as well. For example, you will note in the sectional blow-up that this design eliminates a closely fitted stem and guide. Dirt or other foreign matter doesn't have much of a chance to lodge between these parts and cause sticking.

Another cause of binding or sticking, uneven expansion of closely fitted parts, is also eliminated with this design. In addition, valve stem wear is reduced for the same reason.

Lower maintenance is not the only advantage of this packless construction. Accuracy of regulation is also improved because friction due to a stuffing box, dirt, or uneven expansion is not a problem. The large, *balanced* metal diaphragm is more sensitive to slight changes in pressure.

Guaranteed Not To Wiredraw

If seats and discs are cut by steam (wiredrawn) the loss of steam through these grooves can be another expensive item — directly charged against the regulating valve. Fortunately, you can eliminate these costly leaks by specifying a temperature regulator that is *guaranteed not to wiredraw*.

Spence makes such a guarantee because their seats and discs are made of SECO Metal. Over 20 years experience with this special alloy has failed to produce a single case where a SECO Metal seat or disc had been cut by steam. All that's required is an approved strainer located ahead of the regulating valve. Expensive steam leaks just can't happen with this combination of SECO Metal and single-seat design.

If you would like to have more information on Spence Temperature Regulators, drop us a line and ask for Bulletin T150. It gives more detailed information on these and other Spence design features. Piping layouts and helpful information on the installation of temperature regulators are also included. Write for your copy today.

SPENCE ENGINEERING COMPANY, INC.
Walden, New York

SE 140

TEVA*...best way to compare pipe insulations

Recently a company building a new plant asked us questions about Snap*On, the one-piece pipe insulation of fine glass fibers that simply snaps on pipe. How would 1½" thick Snap*On compare thermally with 2" of another insulation? What effect would it have on material costs? . . . on operating costs?

Our answers were contained in the following TEVA* report:

*Thermo-Economic Value Analysis

PURPOSE . . . to compare Snap*On with Insulation "A".

BASIS OF COMPARISON . . . 15,000 lin. ft. of 8" (average size) pipe
Average Pipe Temperature—350° F
Annual Operating Time—7200 hrs.
Cost of Heat—$0.50/million Btu
Heat Loss Values—Published by manufacturers

CONCLUSIONS

A. HEAT LOSS (Btu/Lin. Ft./Hr.)

Insulation "A", 2" thick	132
SNAP*ON Pipe Insulation, 1½" thick	98
SNAP*ON Savings (Btu/Lin. Ft./Hr.)	34

B. ANNUAL SAVINGS—$ OPERATING COSTS

15,000' x 34 Btu x 7200 Hrs. = 3,672,000,000 Btu
$0.50 (per million Btu) x 3.672 = Annual Saving of $1,836

C. INITIAL SAVINGS—MATERIAL COST

2" Insulation "A", 15,000 lin. ft. @ $2.08	$31,200
1½" SNAP*ON, 15,000 lin. ft. @ 1.404	21,060
MATERIAL COST SAVINGS WITH SNAP*ON	$10,140

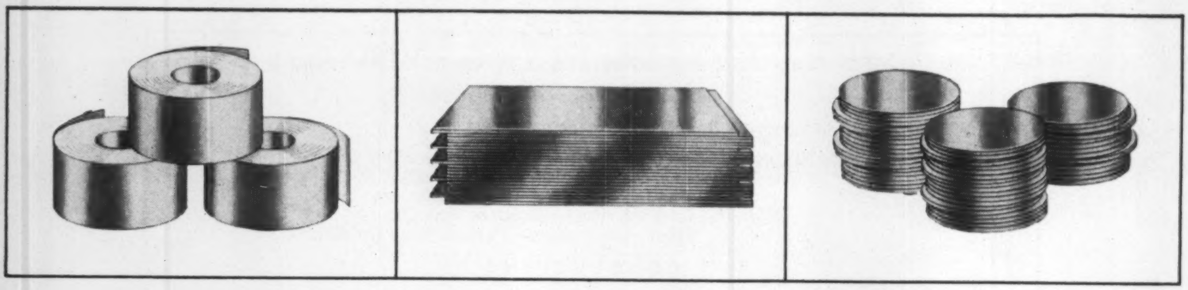
*TEVA (THERMO-ECONOMIC VALUE ANALYSIS) IS AN EXCLUSIVE G-B SERVICE. NO OBLIGATION — JUST CALL YOUR LOCAL G-B DISTRIBUTOR

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

220 W. 10th ST., KANSAS CITY, MO.

If you use aluminum sheet in any form, specify **Fairmont** to get the maximum



Deep-Drawing Superiority • Versatility • Utility!

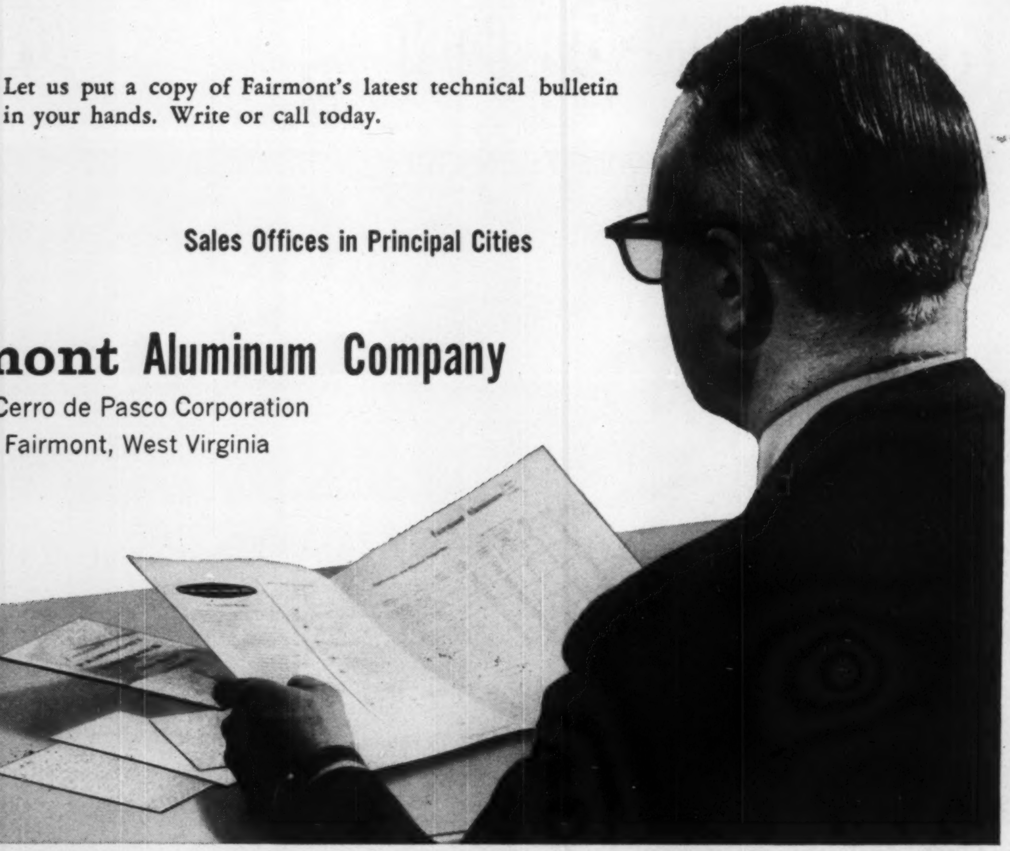
Fairmont wrought aluminum sheet not only meets the standards but exceeds them in mechanical qualifications. Excellent drawing quality, superior finishing and non-earing properties (vitally important to the manufacturer but not definitively qualified in the specification standards) are outstanding examples of Fairmont's superiority. Close adherence to required gauge tolerances is vitally important, since aluminum is bought on a poundage basis.

It is important to you, the purchaser, that every alloy Fairmont makes is rolled every working day.

This affords customers less lead time between ordering and shipment—helps keep inventories low, reducing investment in floor space and work in process. It permits fabricators' change orders to be executed rapidly and economically, if necessary.

And Fairmont's personal attention to orders, both large and small, guarantees maximum satisfaction.

Let us put a copy of Fairmont's latest technical bulletin in your hands. Write or call today.



Sales Offices in Principal Cities

Fairmont Aluminum Company
Subsidiary of Cerro de Pasco Corporation
Dept. H-2 • Fairmont, West Virginia

Keeping Pace with *Your* Progress...

CHESTER

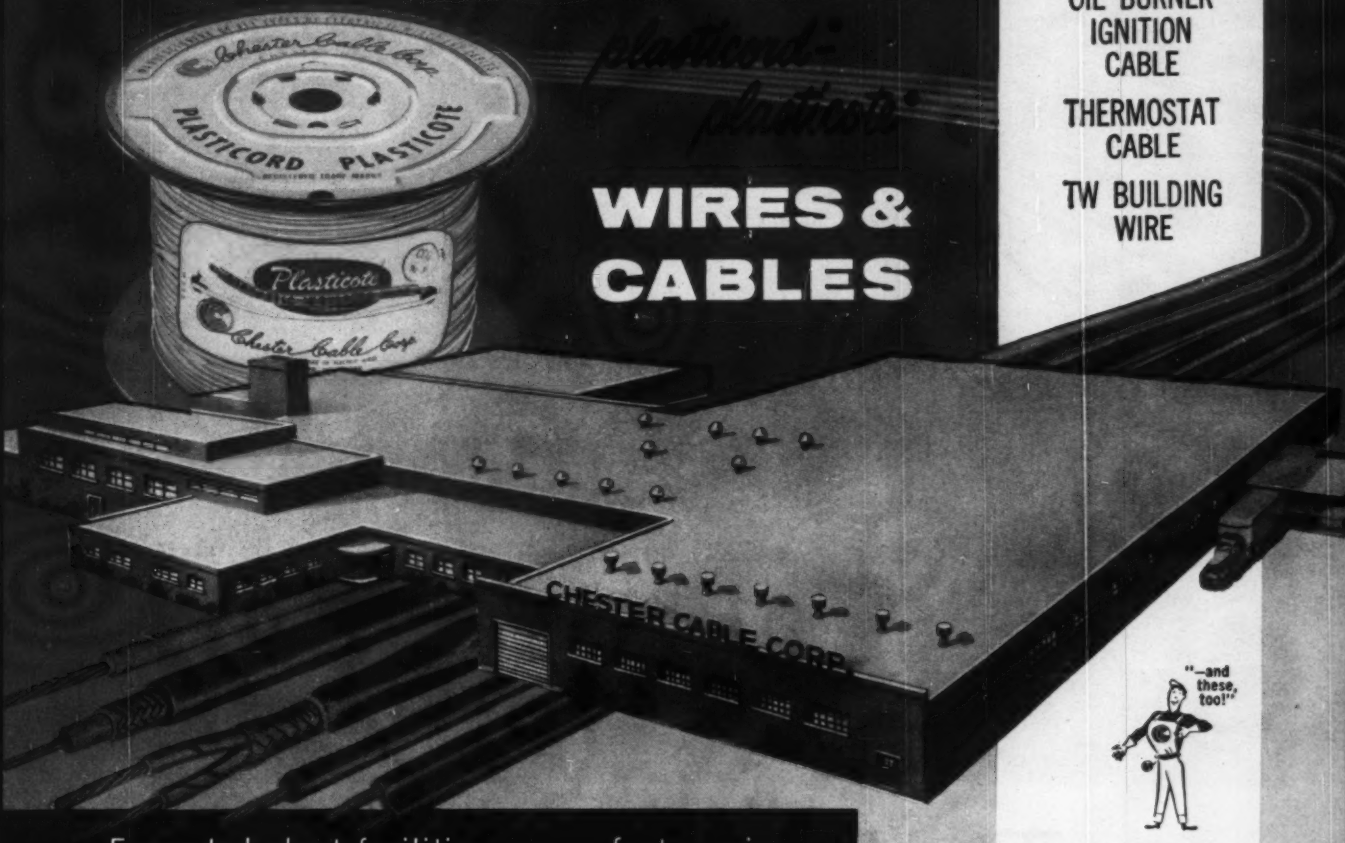
WIRES & CABLES

A complete line of quality wires and cables including —

OIL BURNER IGNITION CABLE

THERMOSTAT CABLE

TW BUILDING WIRE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Chester Cable Corp.
PLASTICORD PLASTICOTE
Plasticote
Chester Cable Corp.
CHESTER CABLE CORP.

"—and these, too!"

Expanded plant facilities assure fast service on famous-for-quality Chester wires and cables

INSTRUMENT WIRE

NON-METALLIC SHEATHED CABLE

APPLIANCE WIRE

ARMORED BUSHED CABLE

FLEXIBLE STEEL CONDUIT

The new ultra-modern Chester Cable Corporation plant is now in full production on super-rugged extra-pliable Plasticote and Plasticord wires and cables. These longer-lasting Chester conductors, plus nylon coated and teflon wrapped wires are available in standard types to meet every wiring requirement. When specifications indicate the use of custom constructions, they can be produced to your special design. The Chester engineering staff, and research facilities, are available to help solve unusual wiring problems.

Pioneer Producers of Plastic Insulated Wires and Cables since 1940

CHESTER
CABLE CORP.
A Subsidiary of Miami Copper Company
30 HILL STREET, CHESTER, N. Y.

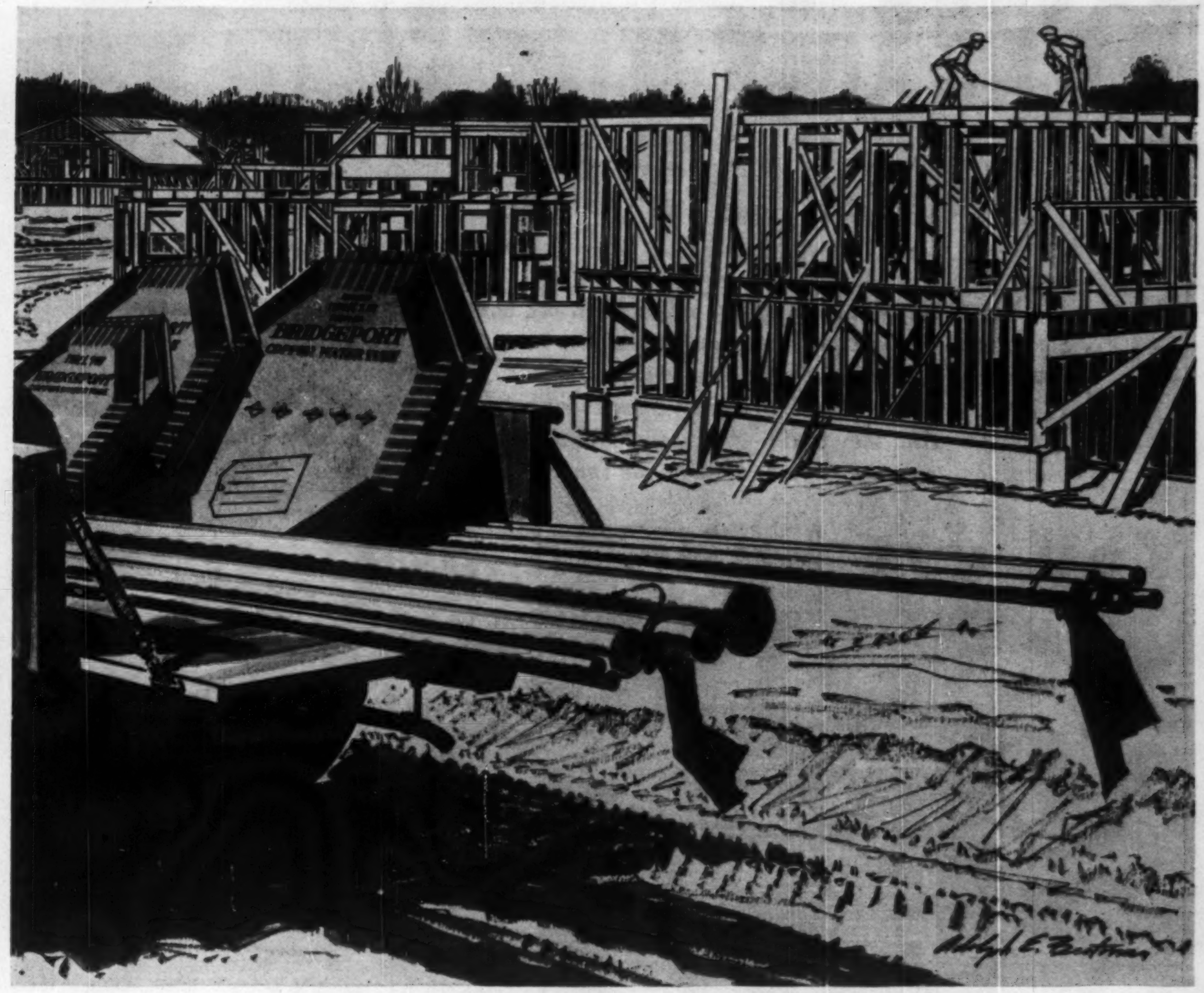
Bridgeport

THREE MEN ON

Here's Why Consulting Engineers, Wholesalers and Contractors

THE ENGINEER wants the best for his buildings. Wants to know that what he specifies in copper water drainage and refrigeration tube bears a name that *means* quality. Wants to know, too, that what goes into his buildings goes in *permanently*. He knows that when he specifies "Bridgeport" as the source for copper tube, his specifications are met to the fullest degree.

THE WHOLESALER'S reputation is built on the firm foundation of dependability (another name for quality). With Bridgeport, he deals with direct factory salesmen who offer and provide technical assistance, sales metallurgy and mill service through Bridgeport's well-integrated national network of sales offices and warehouses.



A "SOURCE"

Make BRIDGEPORT Their Source for Copper Tube

Everything **THE CONTRACTOR** puts into his buildings reflects directly on him. The success of the job is based on the quality of his materials and the service he gets from his suppliers. With Bridgeport, both quality and service are superior. The big jobs require well-timed deliveries, product uniformity and easy workability to get the big jobs done faster. He looks to the Bridgeport Wholesaler for all of these . . . and gets them.

Engineer, Wholesaler or Contractor —there's everything to gain when you put Bridgeport in the picture. Your nearest Bridgeport Sales Office is your strongest link to the *complete* source for plumbing and heating products. Call us today.

BRIDGEPORT
COPPER WATER TUBE

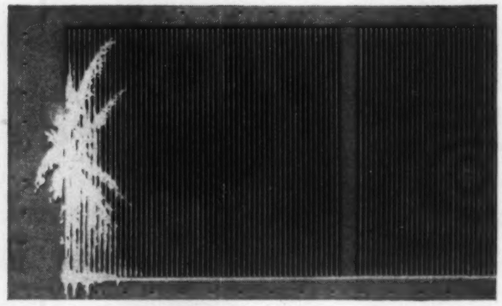
BRASS Bridgeport CO.

MADE IN U.S.A. TO THE STANDARDS OF AMERICAN INDUSTRY

BRIDGEPORT COPPER WATER AND DRAINAGE TUBE

Bridgeport Brass Company, Bridgeport 2, Conn. • Offices in Principal Cities • In Canada: Noranda Copper and Brass Limited, Montreal

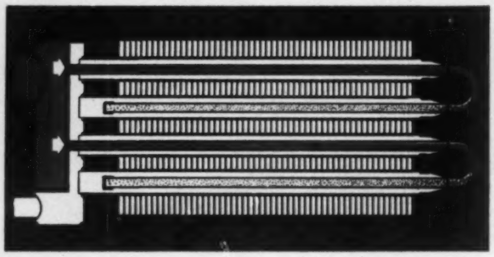
Will it freeze?



Freeze-ups are the biggest headache in heating and air conditioning. Steam condensate exposed to sub-freezing air . . . trapped water in poorly drained surface . . . bursted tubes . . . system shutdowns . . . irate customers . . . and the service costs that eat up profits—these things shouldn't happen to you!

And they won't—if you use Nesbitt Heating and Cooling Surfaces and observe the precautions made easy by the inherent protective features.

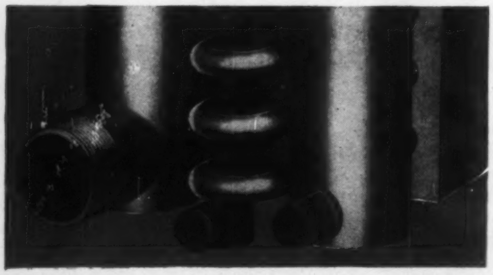
You get built-in protection with Nesbitt Heating & Cooling Surfaces



For full details of this exclusive surface, ask for Publication 305

Each trombone steam-distributing tube serves two adjacent condensing tubes from a single supply-header connection. Steam must travel across the first leg of the trombone tube (full length of surface) before reversing, under demand, to serve the second leg. Results: uniform discharge temperatures, controllability, and freeze protection *under all modulation.*

Series T Heating Surface with Trombone Steam-Distributing Tubes



The story of Water Surface is told in Publication 246

To overcome the difficulty of water-draining in continuous-tube cooling surface, Nesbitt pitches its Series W Surface within the casing and incorporates its exclusive drain headers to relieve trapped bends. The drain feature is also embodied in cleanable-tube surface. No premium is charged for this safety precaution which can save you many dollars of grief.

Series W Water Surface with Pitched Coils and Drainable Feature

If you have been plagued with freeze-up problems, contact your nearest Nesbitt Representative and let him explain these inherent protective features.

MADE AND SOLD BY JOHN J. NESBITT, INC. • PHILADELPHIA 36, PA.

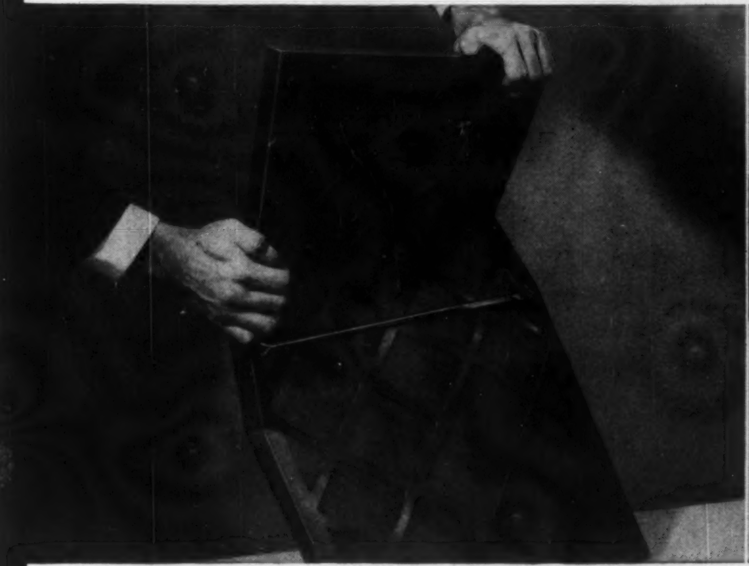
PROVE IT TO YOURSELF

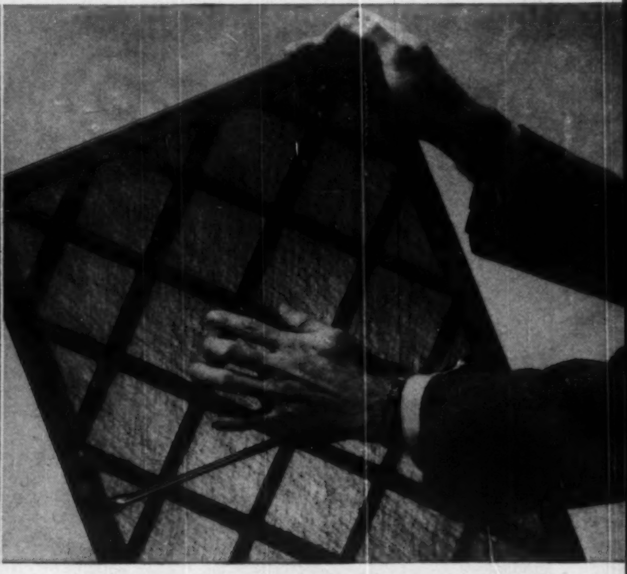
...how much stronger...how much safer

Glasfloss* fiber glass Safety-Grille* filters really are

*TRADE MARK

MAKE THESE TESTS...





1. Bend it—and the new Glasfloss Safety-Grille Filter bounces right back to its original shape. Old type metal-grille filters don't. Unless you re-bend them, they stay bent out of shape and can cut down filtering efficiency. Strong construction of Glasfloss Safety-Grille Filters means less chance of damage in transit, in storage, in handling.

2. Feel the grille edge—it's chipboard, and perfectly safe! No sharp edges—no cuts, no scratches to worry about!

For maintenance personnel, the new Glasfloss Safety-Grille eliminates any danger of cut hands or wrists and possible infection when changing filters.

Plus these features... Glasfloss Safety-Grille Fiber Glass Filters . . .

—have same available filtering area and initial pressure drop as old-type filters
—are tested and proven in service
—are approved by Underwriters' Laboratories, Inc.

Make these tests: Try PPG's new Glasfloss Fiber Glass Safety-Grille Filters in your heating and air conditioning systems. Get top filtering results! They're available in a complete range of sizes from your local distributor or PPG Warehouse.

A Product of Pittsburgh Plate Glass Company

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PPG GLASS

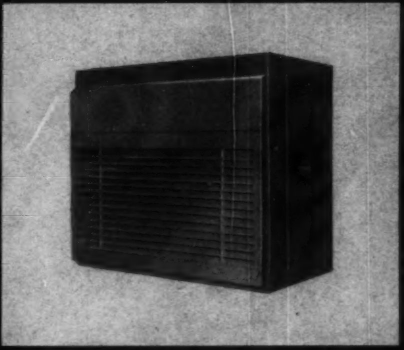
PITTSBURGH PLATE GLASS COMPANY

GLAD

TO HEAR THE EQUIPMENT YOU SPECIFY DELIVERS THE GOODS ON THE JOB? THEN READ THE RIGHT HAND PAGE...

EXCLUSIVE 15 AND 20 TON ACSC

Largest packaged air cooled equipment in the industry. Designed to be roof mounted for outdoor application. Double circuited system, two sets of compressors and condensers, one double circuited evaporator coil. Factory assembled, piped, charged and internally wired. Can be rigged to the roof in one piece. Heating equipment optional.



EXCLUSIVE 10-15-1
20 TON ACCU

10 tons, or 15, 18 and 2
tons capacity arrange
in horizontal or vertic
pairs, all air coole
Rugged construction f
outdoor installation
An oversize condense
low operating hea
pressure. Ample liqu
receiver. Suction ga
cooled. Semi-hermet
compressor, easily ser
iced without removal.

YOU KNOW YOU CAN COUNT ON TYPHOON!

Typhoon adds to your reputation by turning in the kind of performance your clients demand . . . and more! Each and every Typhoon unit is designed and built to stand up to extreme weather conditions and sudden severe temperature changes without strain or breakdown. Typhoon quality begins with Power Reserve—superior components and oversize parts to deliver beyond rated capacity. All copper condensers in water cooled units, largest coil surfaces, and rugged 11 and 14 gauge metal in durable lifetime cabinets. And Typhoon dependability is enhanced by the flexibility of large and small units that can be easily adapted, split or combined to fit any and all installations with maximum ease and economy. Air cooled units from 2 tons to 20 tons, both packaged and as split systems. Water cooled units from 3 tons to 60 tons. Packaged water chillers, 2 tons to 50 tons. Air cooled condensing units to 20 tons, water cooled to 60 tons. For quality, performance, versatility . . . next time specify Typhoon, the industry's most complete line of packaged air conditioners.

TYPHOON
DIVISION OF HUPP CORPORATION

Typhoon Air Conditioning Company
505 Carroll Street, Brooklyn 15, New York

Please send me full product literature on the Typhoon line.

Name____________________________________

Address__________________________________

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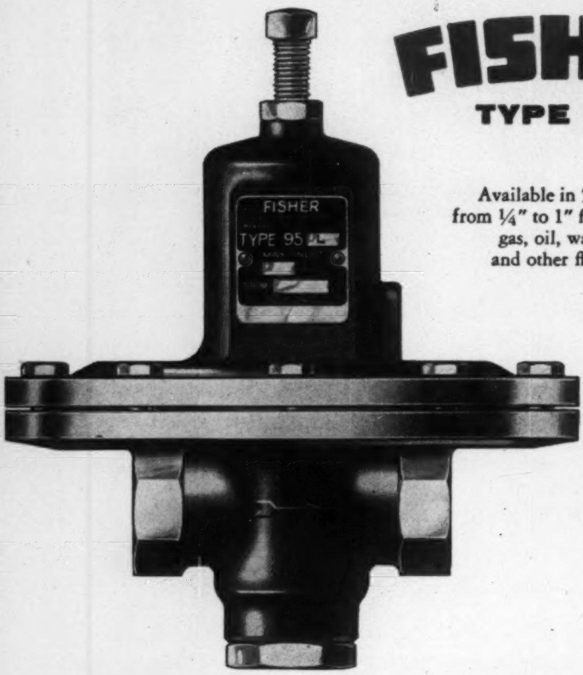
City____________ Zone____ State___________

8C-8

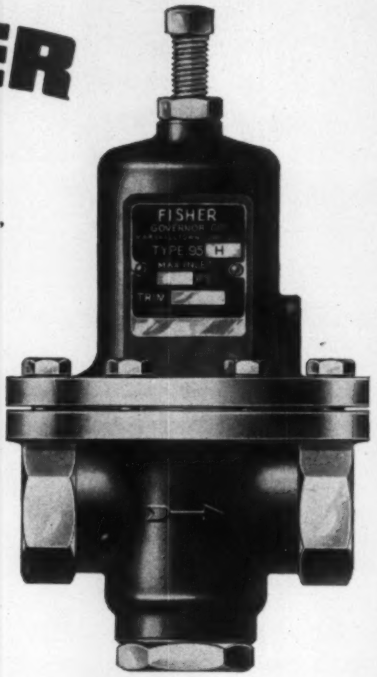
Small Regulator Does Many Jobs!



FISHER

TYPE 95

Available in 5 sizes
from $\frac{1}{4}$" to 1" for steam,
gas, oil, water
and other fluids



TYPE 95L with iron body and composition disc or stainless steel trim. For outlet pressures from 2 to 30 psi.

TYPE 95H available in cast steel or iron bodies for outlet pressures up to 150 psi.

Small Size, Large Capacity, Ideal for Limited Space Jobs

As usual, Fisher engineers have packed this small but mighty regulator with a number of outstanding features.

A.Installation is quick and easy, no external lines, piping or connections.

B.Extremely stable because diaphragm is located in isolated chamber out of the flow stream. No fluid velocity impingement possible.

C.Positive two-point guiding for stem assures smooth action and perfect alignment.

D.Higher capacity results from utilizing downstream pressure through a small registration tube located to produce a velocity boost action. Holds more constant pressure over a wide flow range.

Another outstanding feature is ready accessibility of all parts. Cleaning or inspection is quickly accomplished with simple tools and without removal from the line. Even the diaphragm may be replaced without disturbing the inner valve or orifice.

FOR COMPLETE DATA WRITE FOR BULLETIN C-95

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD... CHANCES ARE IT'S CONTROLLED BY...

FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Canada / London, England

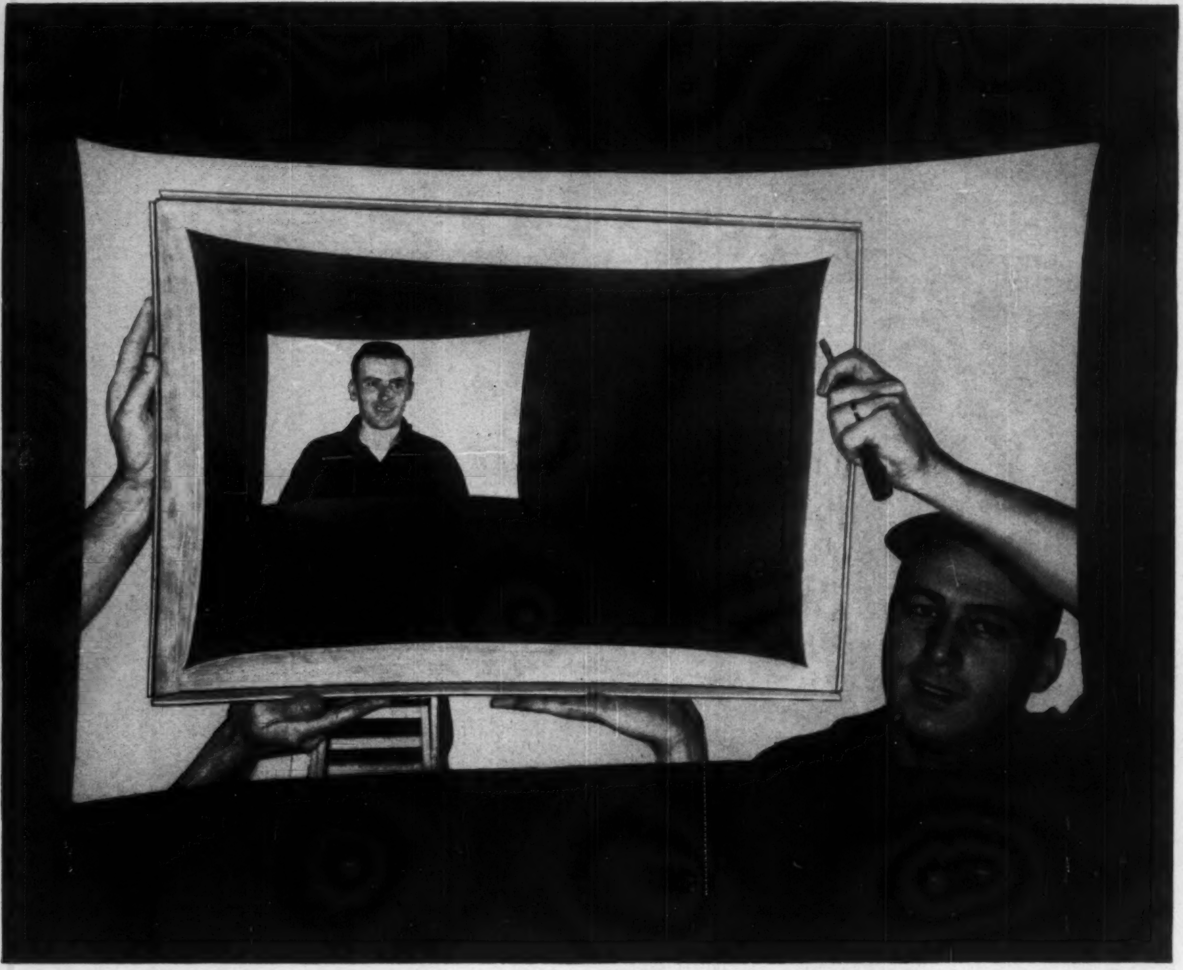
FISHER® Controls

SINCE 1880

New Electric Resistance-Weld Pipe Mill

This new mill produces plain end or threaded and coupled steel pipe in sizes from 5 in. nominal through 16 in. OD, in lengths to 60 ft.

BETHLEHEM STEEL



Ducts lined with L·O·F Glass Fibers' Microtex are easy to fabricate and install; offer maximum insulation per dollar.

L·O·F Glass Fibers' Microtex duct liner gives 3-way protection, even at peak air velocities

For more efficient, 3-way insulation . . . under *all* operating conditions . . . at low cost, specify L·O·F Glass Fibers' Microtex duct liner. Fine glass fibers absorb mechanical noises; insulate warm- and cold-air ducts against heat transfer. Duct itself acts as a vapor barrier. Sprayed facing resists air erosion, even at top operating velocities.

Economical Microtex provides maximum insulation per dollar. Applied quickly with adhesive and formed with the duct in the brake, Microtex requires no special skills, tools or equipment. Can be easily cut and fitted into irregular sections. Available in 1½, 2, and 3 lb./cu. ft. densities, coated with black vinyl, Microtex is:

- strong
- permanent
- lightweight
- fire-resistant
- resilient
- pleasant to handle

Get the facts on high-efficiency, low-cost Microtex duct liner. Contact our distributor, or write: *L·O·F Glass Fibers Company, Dept. 39-38, 1810 Madison Avenue, Toledo 1, Ohio.*

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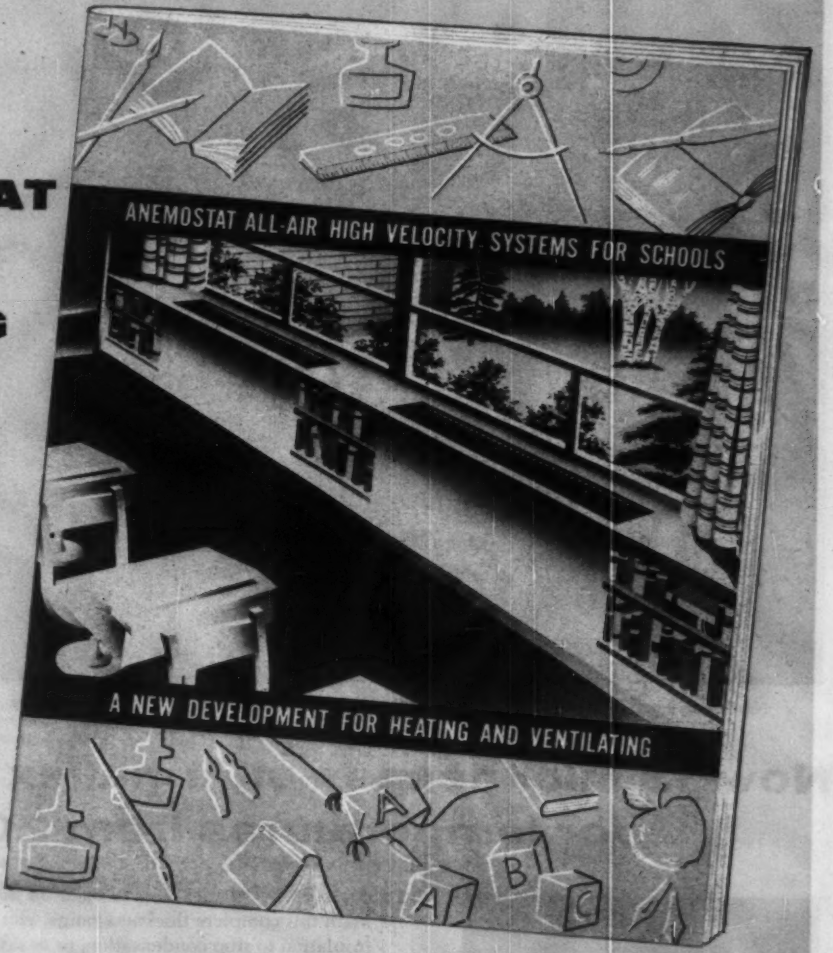
L·O·F GLASS FIBERS COMPANY • TOLEDO 1, OHIO

Are you building a new school or renovating an old one?

New ANEMOSTAT SCHOOL CATALOG

contains *necessary* application and selection data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A NEW DEVELOPMENT FOR HEATING AND VENTILATING
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Gentlemen:

Please send me, without obligation, a copy of your new School Catalog.

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Company......................................
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City........................ *Zone*...... *State*....

New Armaflex line includes ⅜", ½", and ¾" nominal wall thicknesses to 3" IPS. On larger piping, Armaflex sheets are used.

Now—3 thicknesses of Armaflex pipe covering for temperatures from 200° down to 0°

Fitting covers can be made up easily and quickly from mitered segments of Armaflex joined with 520 Adhesive.

Armstrong Armaflex now is made in three wall thicknesses–⅜", ½", and ¾". With this complete thickness range, you can specify the economical amount* of insulation to stop condensation, or to save heat, on lines operating from 200° F. all the way down to zero. Armaflex is a highly efficient, flexible foamed plastic pipe covering with a k factor of .28 at 75° F. mean temperature. Its closed cell structure seals out all air, vapor, and moisture.

A big advantage of this flexible insulation is the speed with which it can be applied. Labor costs drop as much as 50%, compared to costs of applying conventional type insulations to pipes and fittings. Armaflex can be slipped over piping before connections are made, or slit and snapped on. Joints are sealed with 520 Adhesive. Fittings are insulated with miter-cut pieces.

* **Recommended Armaflex thicknesses** for various service conditions are listed in free descriptive booklet. For a free copy, write today to Armstrong Cork Company, 2203 Sherman Street, Lancaster, Pennsylvania.

Armstrong INSULATIONS

DATA SHEET NO. 2

Short Form Guide to Selecting the Proper

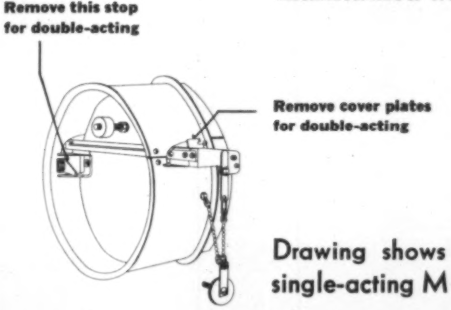
Field TRIPLE-FUEL M+MG2

The Field M+MG2 is a triple-fuel control providing equally precise draft regulation for solid fuels, oil, gas, or oil-gas, and requiring only the simplest, on-the-job adjustments when fuels are changed. It is a heavy duty control, in sizes 10″ through 32″.

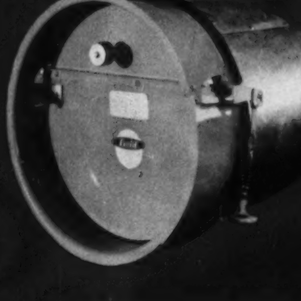
APPLICATIONS: Specify for solid fuels, oil, gas or oil-gas furnaces and boilers, with natural, induced or forced draft. In a gas installation, specify the M+MG2 instead of a draft hood in order to give the appliance the assistance of the chimney. Gas installations need a moderately strong draft, and a draft diverter, by its very nature, reduces the draft in breeching or flue to essentially zero.

WHAT TO SPECIFY: For oil, gas, or oil-gas, specify the standard M+MG2. It will be shipped as a single-acting oil control. The simple adjustment required for gas will be made during installation. For solid fuels specify the Field M+MG2 Barochek.

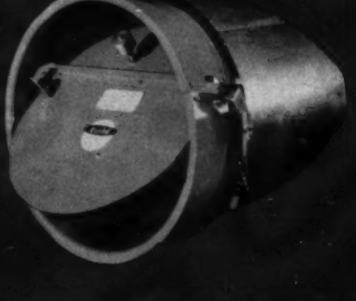
CHOOSING SIZE AND LOCATION: See tables and sketches on reverse side. Note that where two or more boilers connect into one chimney a draft control should be installed on each individual branch or uptake, so that different drafts can be maintained at each boiler outlet if necessary.



Drawing shows simple stops removed to permit single-acting M+MG2 to become double-acting.



M+MG2 Single Acting for Oil



M+MG2 Double Acting for Gas, opens inward to regulate up drafts, and opens outward to relieve internal pressures.

M+MG2 Barochek for Solid Fuels

Remove and file for reference.

Perforat for easy tear-out.

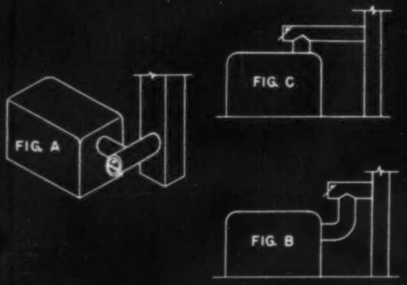
SPECIFICATION DATA — FIELD TRIPLE-FUEL M+MG2

APPROVALS: The M+MG2 is Listed by Underwriters' Laboratories as a single acting control for solid fuels and oil, and as a double-acting control for gas. America's leading gas utilities have approved and are actively recommending the use of Field Draft Controls.

PHYSICAL DIMENSIONS: Dimension drawings and tables for all sizes of the M+MG2 appear on the Field Data Sheet No. 1, in January issues of Heating, Piping & Airconditioning, and Gas Age, and February issues of Airconditioning, Heating & Ventilating, and Gas magazine.

Data Sheet No. 3 will answer the question: "Why Specify a Field Barometric Draft Control for Gas?"

BEST LOCATIONS FOR GAS



BEST LOCATIONS FOR OIL OR SOLID FUELS

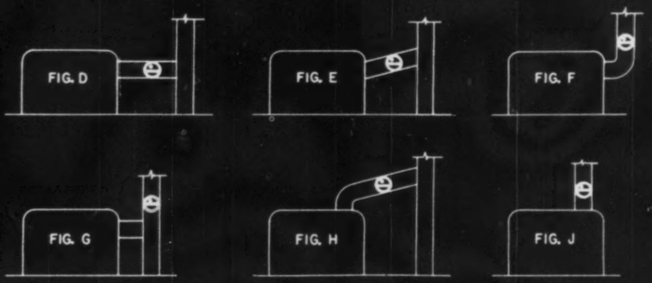


TABLE ONE — GUIDE FOR SELECTING CORRECT SIZE M+MG2 CONTROL FOR OIL-FIRED OR COAL-FIRED PLANTS

DIAMETER OF FLUE or Breeching	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL
12"	20' or less	10"	21—30'	12"	31— 55'	14"
13"	20' or less	12"	21—40'	14"		
14"	20' or less	12"	21—35'	14"	36— 60'	16"
15"	30' or less	14"	31—45'	16"		
16"	25' or less	14"	26—40'	16"	41— 70'	18"
17"	35' or less	16"	36—50'	18"		
18"	30' or less	16"	31—45'	18"	46— 65'	20"
19"	40' or less	18"	41—55'	20"		
20"	35' or less	18"	36—50'	20"	51—100'	24"
21"	40' or less	20"	41—85'	24"		
22"	35' or less	20"	36—70'	24"		
23"	30' or less	20"	31—60'	24"		
24"	30' or less	20"	31—55'	24"	56—100'	28"
25"	50' or less	24"	51—85'	28"		
26"	40' or less	24"	41—75'	28"		
27"	35' or less	24"	36—70'	28"		
28"	35' or less	24"	36—65'	28"	66—100'	32"
29"	55' or less	28"	56—95'	32"		
30"	50' or less	28"	51—85'	32"		
31"	45' or less	28"	46—75'	32"		
32"	40' or less	28"	41—70'	32"		
33"	60' or less	32"				
34"	55' or less	32"				

TABLE TWO — GUIDE FOR SELECTING CORRECT SIZE M+MG2 OR MG1 CONTROL FOR GAS-, OR OIL-GAS FIRED PLANTS

DIAMETER OF FLUE or Breeching	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL
7"			35' or less	8"		
8"			25' or less	8"		
9"	15' or less	8"	16—40'	10"		
10"			30' or less	10"	31— 50'	12"
11"	20' or less	10"	21—42'	12"		
12"	20' or less	10"	21—30'	12"		
13"	22' or less	12"	23—70'	16"		
14"			55' or less	16"		
15"			45' or less	16"		
16"			40' or less	16"		
17"	35' or less	16"	36—90'	20"		
18"	30' or less	16"	31—75'	20"		
19"			60' or less	20"		
20"			36—50'	20"	51—100'	24
21"	40' or less	20"	41—85'	24"		
22"	35' or less	20"	36—70'	24"		
23"	30' or less	20"	31—60'	24"		
24"	30' or less	20"	31—55'	24"	56—100'	28"
25"	50' or less	24"	51—85'	28"		
26"	40' or less	24"	41—75'	28"		
27"	35' or less	24"	36—70'	28"		
28"	35' or less	24"	36—65'	28"	66—100'	32"
29"	55' or less	28"	56—95'	32"		
30"	50' or less	28"	51—85'	32"		
31"	45' or less	28"	46—75'	32"		
32"	40' or less	28"	41—70'	32"		
33"	60' or less	32"				
34"	55' or less	32"				

Chimney height is measured from floor of boiler room. If **very low draft** must be maintained, use control one size larger. If **very high draft** will be necessary, a control one size smaller may be used.

FIELD CONTROL DIVISION
H. D. Conkey & Company, Mendota, Illinois

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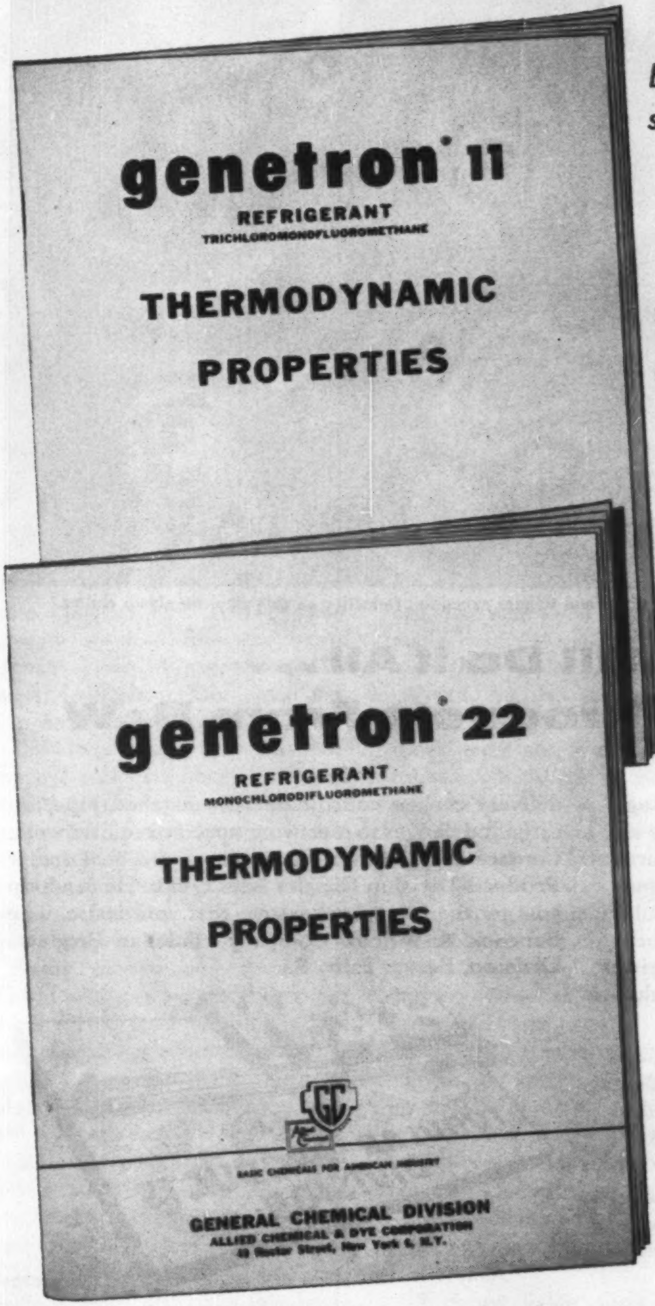

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Every Refrigeration Engineer should have this important data!

These new tables, 32 pages and 36 pages respectively, offer three important advantages:

1. Electronic computation, completely eliminating computational inaccuracies.
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Genetron 11— Saturated Properties:
−40° to 298°F
in 1°F intervals

Superheat Properties:
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Genetron 22— Saturated Properties:
−150° to −50°F
in 2°F intervals
and
−50° to 150°F
in 1°F intervals

Superheat Properties:
0.1 to 300 psia

Write today (on business letterhead, please) for these two significant new sets of tables. We will be glad to send you free copies.

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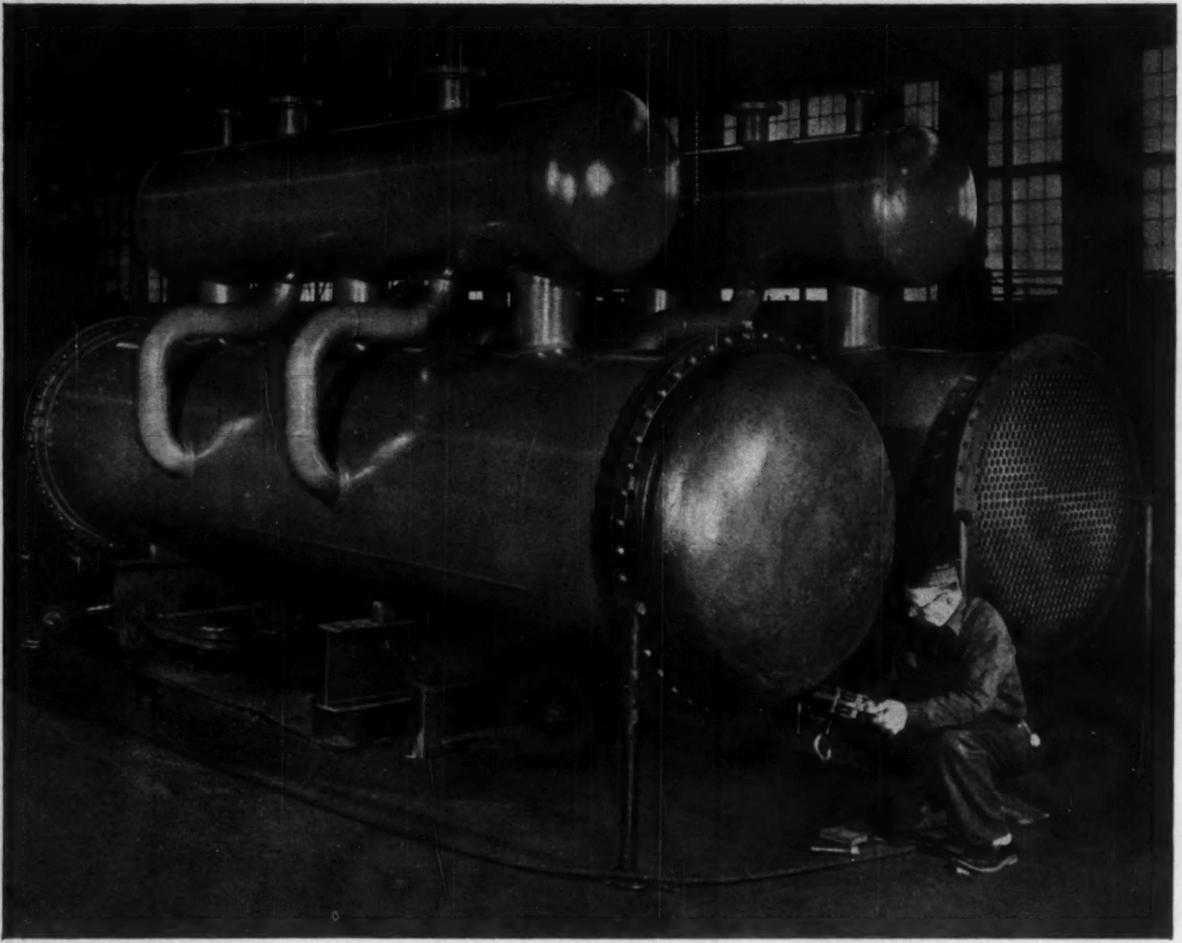

Single source supply—B&W tubes, fittings and flanges expedite production of this ethylene glycol chiller.

One Call Will Do It All . . .
Specify Tubular Products From B&W

In one recent installation, the tubes, welding fittings and flanges of two ethylene glycol chillers were all supplied by B&W. The reason for this one-source buying? The fact that designers, engineers and purchasing agents alike know that B&W Tubular Products will do the best job possible . . . efficiently, dependably and economically. One-source buying insures integrated delivery and expedited production in your shop.

And besides the advantages inherent in a centralized source of supply, B&W offers another outstanding value in its Tubular Products. Tubes are tailored to specific jobs. The result—when you specify B&W, you get what you order.

One simple call to B&W can bring you these benefits. As part of the same call and the same service, delivery can be coordinated on matched pipe, fittings and flanges to meet your specific requirements. Contact Mr. Tubes at your nearest B&W Tubular Products Division District Sales Office. He can help you get the integrated system that you desire. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

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Seamless and welded tubular products, seamless welding fittings and forged steel flanges—in carbon, alloy, and stainless steels

The Editors' Pages

Construction Outlay Up 3 Percent in January

. . . $3.3 billion spent

EXPENDITURES during January of $3.3 billion for new construction put in place set a new record for that month, exceeding by 3 percent the previous January high established a year earlier, according to preliminary estimates of the U. S. Depts. of Commerce and Labor.

Outlays in January declined from December by 10 percent—no more than usual for the time of year—and were at a seasonally adjusted annual rate of $48.5 billion, compared with actual outlays of $47.3 billion in the peak year 1957.

Private spending for new construction amounted to nearly $2.4 billion this January and was up slightly from January 1957. The main strength stemmed from the record January levels of expenditures for public utilities, office buildings, churches, and hospitals.

However, private industrial construction and store building dropped 11 and 16 percent respectively from January 1957 levels. On a seasonally adjusted basis, industrial plant construction retreated to the March 1956 volume, while store building hit the lowest point in 36 months.

Public construction expenditures showed a 6 percent gain over the January 1957 level and for the first time exceeded a seasonally adjusted annual rate of $15 billion. Some of this rise was stimulated by a new January high in outlays for public schools. Expenditures for public housing were more than double the amount spent in January 1957 and were the highest since February 1952. Activity in some public segments declined materially this January, with water facilities and military projects dropping 14 percent, and public industrial plants off 32 percent from January 1957. ‡

Employee Turnover Down In Air Conditioned Plants

. . . installations pay for themselves

REDUCED employee turnover, increased efficiency, and lowered absenteeism are reported in scores of manufacturing plants where air conditioning has been installed, according to Carrier Corp.

One such facility in Pittsburgh, for example, has air conditioned steel mill crane cabs. These cranes haul 20 tons of molten metal at temperatures as high as 3200 F, which would bring cab temperature up to 180 F. The conditioning unit maintains a temperature of 78 F in a 22½ sq ft cab. The same sized unit would normally handle a space of 580 sq ft, more than 25 times as large.

Not so hot, but still warmer than normal was a bakery in Cincinnati, which turns out 6 million units of baked goods daily. The maintenance engineer for the company, states: "Cooling these cakes used to be our biggest problem. Even with a modern conveyor system, we had to shove racks containing 200 to 400 cakes into corners, then wait 3 or 4 hr for them to cool. While this cooling was going on we had to stop other machinery to avoid a jam-up. That meant employees went for a long smoke, or just sat around killing time."

He credits air conditioning with a 15 percent increase in productivity because it broke a log jam in the "cake assembly line," and also made employees more alive, alert, and comfortable.

A cigaret lighter plant in Bradford, Pa., is completely air conditioned, not because climate control has any special effect on the production process, but because its founder insists upon giving his employees the best in working comfort and efficiency.

This type of treatment not only gives the company a backlog of employment applications but contributes markedly to top job efficiency.

Echoing this sentiment is a manufacturer in Clemson, S. C. The plant produces rayon tire cord, which makes heat excessive in most production areas.

Following the installation of air conditioning — and a scarcity of production workers — this plant had not only all the skilled help it needed, but actually boasted a waiting list of people who wanted to work in an air conditioned plant.

Another manufacturer reports: "Complete air conditioning of all our plants built in the past five years has much more than paid for itself in terms of increased efficiency and reduced costs of operation." ‡

Lester S. Ries Joins HPAC Editorial Board

. . . expert on school maintenance

HEATING, PIPING & AIR CONDITIONING takes pleasure in announcing the appointment of Lester S. Ries to its board of consulting and contributing editors.

Mr. Ries attended the University

of Illinois and the Michigan College of Mines and Technology, graduating from the latter in 1910.

From 1910 to 1924 he served in various engineering capacities with the Oliver Iron Mining Co., a division of United States Steel Corp. He was with the University of Chicago department of buildings and grounds from 1925 to 1937, and served Oberlin College in a similar capacity from 1937 until 1955, the year of his retirement.

Mr. Ries is author of numerous articles appearing in Heating, Piping & Air Conditioning, as well as a contributor to other publications.

He is a registered engineer and is a member of the American Society of Heating and Air-Conditioning Engineers and the National Association of Physical Plant Administrators of Colleges and Universities. ╪

2 Percent Increase in '57 Construction Contracts

. . . over year earlier total

CONSTRUCTION CONTRACTS in 1957 totaled $32,173,412,000, two percent ahead of the 1956 total, according to F. W. Dodge Corp.

While strictly comparable figures are not available for years before 1956, a Dodge official said that 1957 "undoubtedly set an all-time record."

The 1957 figure was the first annual construction contract total ever released for all 48 states, since statistics prior to 1957 covered only the 37 states east of the Rockies. Back data on the 48 state basis was compiled for 1956, in order to make possible comparisons with 1957. ╪

Gas Tagging Technique Exposes Guilty Plant

. . . provides air pollution data

A METHOD for tagging the gases issuing from a smoke stack or other suspected source of air pollution which involves radioactivation of a tracer substance now makes it possible to determine how much of the total pollution at locations several miles away is caused by the emissions from a particular plant.

The technique fills a need important both to industry and to public agencies, since it can resolve disputes as to the relative responsibility of different sources and lead to constructive action directed toward the real offender. This marks the first time the neutron activation technique has been applied to air pollution studies.

Details of the technique were developed under direction of Wesley C. L. Hemeon, of Hemeon Associates, air pollution research engineers of Pittsburgh, in collaboration with George F. Haines, Jr., also of Hemeon Associates, and Herman Cember, assistant professor of industrial health, University of Pittsburgh Graduate School of Public Health. The research was sponsored by the American Petroleum Institute and was conducted at Mellon Institute.

The method involves injecting "shots" of very fine powdered antimony oxide into the stream of gases issuing from a smoke stack. At the same time, automatic air sampling instruments operating at scattered locations up to several miles away are ready to pick up any tracer powder that chances to drift past.

After testing is completed, samples are collected from the various instruments and analyzed to determine the quantity of any tracer powder caught by the instrument filter. Calculations can then be made to see how much of the air pollution from the stack arrived at that location as compared with other sources.

By deferring radioactivation of the tracer samples until after they have been collected safely in the laboratory, the extreme sensitivity of radioactive measurement is enjoyed without the hazard or inconvenience that would otherwise be met. ╪

Proclaim March 16-22 National Library Week

. . . for a better read America

A "BETTER READ, better informed America" is the objective of the first nationwide campaign to promote reading. This promotion and educational program, with the theme "Wake Up and Read!", will be climaxed by National Library Week, March 16-22.

This effort is a combined undertaking of publishers in the magazine, newspaper, and book industries with librarians and others to stimulate the basic interest of reading. ╪

Construction Cost Index Shows 2 Point Increase

. . . in fourth quarter, 1957

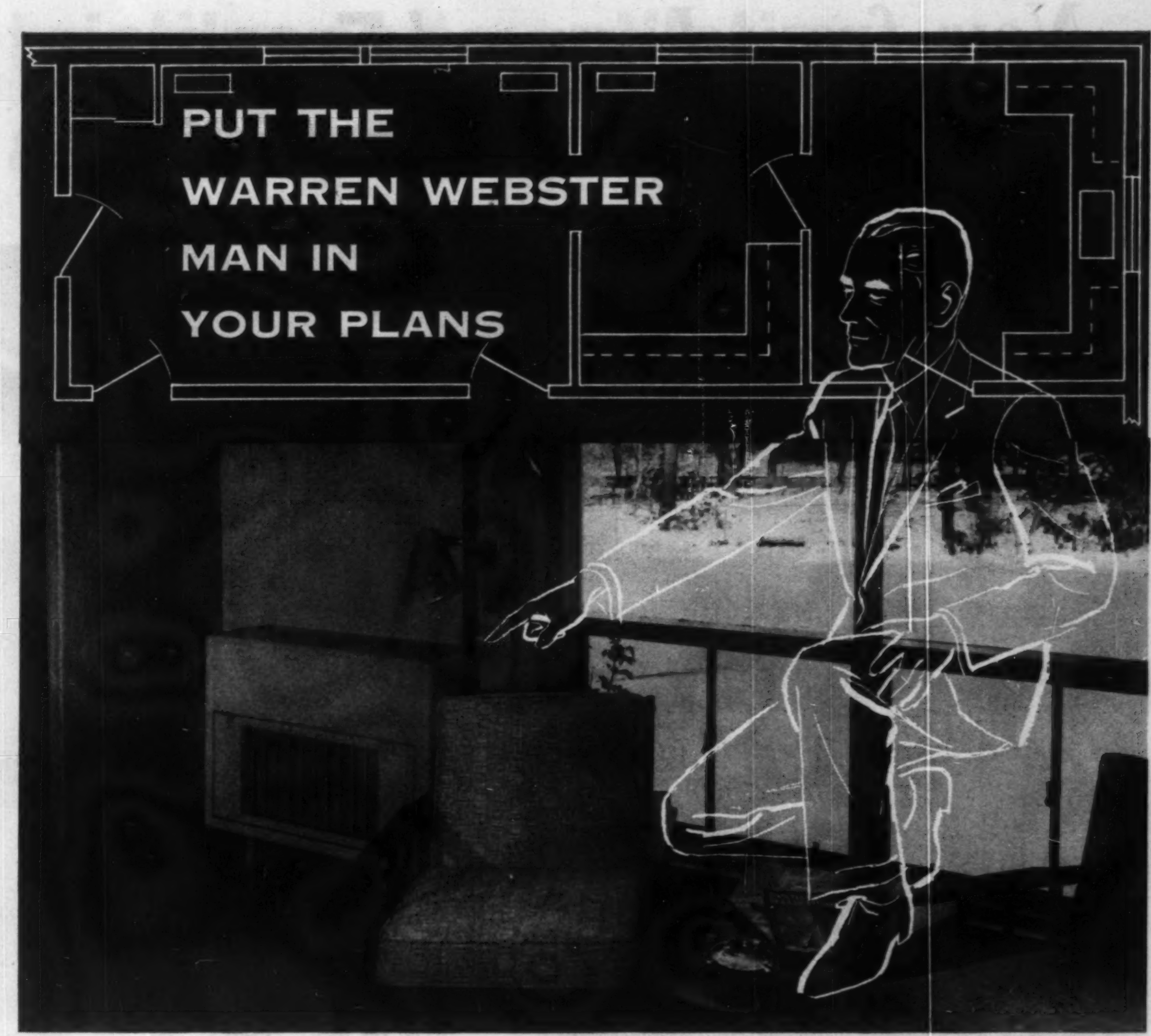
THE American Appraisal Co. construction cost index (national average) rose 2 points during the fourth quarter of 1957, resulting in a total rise of 25 points for 1957. This compares with 28 points for 1956.

Higher prices on steel, freight rates, and higher labor rates all contributed to this index.

The index is based upon a detailed analysis of materials and labor required for representative types of industrial building structures, repriced monthly in accordance with (1) prevailing wage scales and labor performance for the various building trades, and (2) quotations for materials in 30 cities. ╪

"Quote"

"Observe the turtle — he only progresses when his neck is out."—*G. B. Wadzeck, superintendent of schools, San Angelo, Texas, at the symposium on school heating, ventilating, and air conditioning at the 64th annual meeting of the American Society of Heating and Air-Conditioning Engineers, held recently in Pittsburgh.*



Now You Can Have Newport Comfort... Winter or Summer

It's winter outside . . . but the handsomely-styled Webster Newport Air Conditioner isn't idle. It's working quietly, efficiently, to provide comfortable, even heat in this doctor's reception room.

The new through-the-wall Webster Newport Conditioner offers complete flexibility — air conditioning in the summer, plus the winter-long comfort of modern central-system HYDRONICS heating, using hot water or steam.

What's more, here's complete thermostatic control, winter and summer, at each unit . . . and no window obstruction. All this for less than a central chilled water system . . . less than an air system using ducts. In three capacities, same-size cabinet. Units for cooling only, if desired.

Talk it over with your Warren Webster Man. Or write us for Bulletin B-2020. Warren Webster & Company, Camden 5, New Jersey. Since 1888. Offices in principal U.S. cities and Canada.

WEBSTER'S
FINEST
PRODUCT

the Warren Webster Man

WARREN WEBSTER
HEATING . . . COOLING

New from Lennox! **Fresh air for classrooms . . . for as little**

Lennox Air Processing Unit introduces fresh air in adjustable volumes (A); transmits warm air (B) from adjacent or remote heating unit; continuously recirculates indoor air (C); filters air clean (D). Lennox' exclusive floating blower (E) and acoustical lining (F) assure a degree of quietness never before achieved.

LENNOX COM

heating and ventilating as $1.03 per square foot!

New Lennox Comfort Curtain system automatically draws in fresh air from outside...warms, cleans, circulates air...provides tons of needed cooling without the cost of refrigeration!

Across the country, the Comfort Curtain system is drastically reducing the cost of school heating and ventilating. Costs per square foot of $1.03 in Indiana, $1.15 in Montana, $1.12 in South Dakota are typical examples. One job went in for a cost so low we hesitate to quote it—*just 65c per square foot.* That was in Potosi, Missouri!

A NEW APPLICATION

These exceptional savings are the result of a new approach to classroom heating and ventilating, provided by the Lennox Comfort Curtain system. This new system applies to schoolrooms the sound, tested principles of warm air heating (long the preferred method of residential heating), thus eliminating the pipes, boilers, towering chimneys and inflexible heating plants that have made average heating installation costs considerably higher.

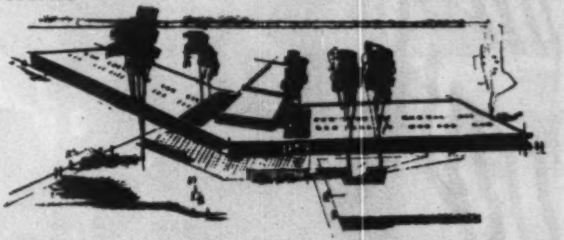
Nor is this all. The Lennox Comfort Curtain can easily save hundreds of dollars per classroom each year it is in use. Fuel is consumed only when heat is required, maintenance and service are amazingly simple and low-cost—well within the capacity of any competent local heating dealer.

And most important, the Lennox Comfort Curtain system actually does a *far better* job than costlier systems used previously. The Comfort Curtain does a *complete* job, provides a full, even flow of air throughout its entire length along the exposed classroom wall. It is amazingly quiet. And it holds room temperatures to a variance of six-tenths of one degree, circulates air continuously for perfect distribution, introduces a continuous supply of fresh air during the daytime heating cycle, and provides *tons* of needed cooling without the cost of refrigeration.

COOLING WITHOUT REFRIGERATION!

Extensive surveys show that on almost every day when the temperature is above freezing, the classroom no longer requires heat, shortly after pupils assemble. True, at 33° the average classroom needs about 20,000 Btuh. But 30 pupils will generate about 12,000 Btuh, lighting will add another 8,000 to 10,000 Btuh, and the sun load can account for as much as 15,000 Btuh. Since the amount of heat being generated exceeds the classroom heating requirement, it becomes necessary to *cool* the classroom to maintain a healthful, comfortable temperature. The Lennox Comfort Curtain system does this automatically by introducing cool, fresh outside air to meet the need. Even if the temperature of the outside air is as much as 50°, the equivalent of two tons of cooling can be provided in this way

There is today no possible way to achieve all these advantages at so little cost—except with the Lennox Comfort Curtain. The system is completely flexible, uses child-proof wall- or bookshelf-ducts, installs readily in any size or design of school, comes completely equipped with a "laboratory matched" control system. Send coupon below for free booklet.



The 24-classroom Junedale school, located in Gary, Indiana, will be heated and ventilated by the Lennox Comfort Curtain for $1.03 per square foot. Architect: David J. Katz, A.I.A. Heating Contractor: Quality Heating and Air Conditioning.

LENNOX

©1958 Lennox Industries Inc., founded 1895; Des Moines and Marshalltown, Ia.; Syracuse, N.Y.; Columbus, O.; Decatur, Ga.; Ft. Worth; Los Angeles; Salt Lake City. In Canada: Toronto, Montreal, Calgary, Vancouver, Winnipeg.

Lennox Industries Inc., Dept. HP-81
1701 E. Euclid Ave., Des Moines 5, Iowa

Gentlemen: Please send me your free booklet on the Comfort Curtain system of classroom heating and ventilating.

NAME ____________________

ADDRESS ____________________

____

CITY ____________ ZONE ____ STATE ____________

FORT CURTAIN

Little Things Produce Big Results

WHEATLAND - 58

...like Wheatland Steel Pipe Quality

A little thing—a finger in a dike—once accomplished so much. Today at the Wheatland mill, it's the *small* detail, done well, that produces finer quality steel pipe—formable, weldable, durable and strong—the kind of pipe *you* want for *your* installations.

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"Open for Discussion"

• WE FOLLOW HERE each month the practice at engineering society meetings of providing an "open for discussion" period. You are urged to take part. Just address your comments to the Editors, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

What Air Velocity Was Assumed For Chart of Equivalent Lengths?

IN THE Data Sheet, *How to Find Equivalent Lengths of Elbows in Rectangular Ducts,* by Julian T. Eubanks, in the December 1957 issue, what air velocity was assumed for the construction of the very interesting chart? If higher velocities were assumed for the larger ducts than for the smaller ones, what velocity values were used for the different sizes?

GUY VOORHEES
Technical Secretary, Emeritus
National Warm Air Heating and
Air Conditioning Association
Cleveland, Ohio

THE AUTHOR'S REPLY — I appreciate Mr. Voorhees' interest in my chart. It is gratifying to know that someone in his position was interested enough to take time to ask for additional information concerning it.

At first glance Mr. Voorhees' question appears to be a simple one. However, such is not the case. The energy loss in duct elbows is a complex matter involving many variables, and any empirical method such as the chart is necessarily of limited accuracy. Still, the data upon which this chart is based has for several years been considered of sufficient accuracy to be used in the design of heating and air conditioning ducts.

The formula upon which this chart is based,

$$L/W = [0.33\ (R/W)]^{-2.13(H/W)^{0.126}},$$

was derived by David W. Locklin. He made an extensive survey and analysis of the available data on the energy losses in 90 deg duct elbows. This information is published in the ASHVE Journal Section in the September 1950 issue of Heating, Piping & Air Conditioning in the paper entitled, *Energy Losses in 90 Degree Duct Elbows — A Survey and Analysis of Available Information.*

Mr. Locklin states that there are several dimensional variables affecting the flow of a fluid through conduit bends. These are the velocity of the fluid, the velocity of sound in the fluid, the density of the fluid, the viscosity of the fluid, the acceleration due to gravity, the hydraulic diameter of the duct, the radius of the bend, the height, width, and absolute roughness of the duct, the center line length of the bend, and the area of the inlet and of the outlet of the bend. He reduces these to the following dimensionless terms, of which the total loss coefficient of the elbow, k, is a function: Reynolds number, Mach number, radius ratio, aspect ratio, relative roughness, angle of bend, and ratio of inlet and outlet area.

The Mach number can be disregarded because the compressibility in fittings at the air velocities used in air conditioning work is negligible. The angle of bend and the ratio of inlet and outlet area can likewise be eliminated because consideration is being given only to 90 deg bends of constant cross section. The relative roughness and the Reynolds number can be replaced with the friction factor for straight pipe. The elimination of the Mach and Reynolds numbers removes the two terms containing velocity.

Reynolds number = (density × velocity × hydraulic diameter)/ viscosity
and
Mach number = fluid velocity/velocity of sound in the fluid

This leaves only the friction factor, f, radius ratio, (R/W), and aspect ratio, (H/W), as the only variables involved.

Mr. Locklin then presents data in the form of a series of curves showing that the ratio of the total loss coefficient of k to f is nearly constant for the range of friction factors involved in this type of work. He states that this is the justification for expressing the resistance of an elbow in terms of equivalent length of straight duct.

By equating the loss due to a fitting, $kV^2/2g$, to the loss of a length of straight duct of equal resistance, $h_t = fLV^2/D2g$, the total length in terms of the hydraulic diameter, $k/f = L/D$, is derived.

Where:

h = loss due to a fitting,
h_t = loss in straight duct
V = velocity
g = acceleration due to gravity
L = length of duct with resistance equal to that of an elbow
D = hydraulic diameter.

The dimensional variables listed above have now been reduced to the relation L/D, as a function of R/W and H/W.

With all the variables eliminated except the radius ratio and the aspect ratio, Mr. Locklin plotted a number of series of curves of various radius ratios and aspect ratios, and substituted widths of the duct for hydraulic diameters. From this data he developed the empirical formula upon which I based my chart.

Therefore, the velocity of the air in the duct did not enter into the plotting of the chart at all. Instead, the derivation is based on other factors.

JULIAN T. EUBANKS
Consulting Engineer
Augusta, Ga.

Why Not High Temperature Hot Water Heating System For Thule Air Base?

With reference to the article *Army Vies With Nature to Heat Arctic Air Base,* by Nelson E. Pearsall and Wallace O. McClune, in the December 1957 issue, it certainly appears to me that the use of high temperature hot water would have been better suited for this project than high pressure steam. From operational and maintenance standpoints alone, the savings would be substantial.

I wonder whether or not the advantages of high temperature hot water heating were reviewed prior to the design of this system and, if so, what the findings might have reflected.

William F. Ryan
Ryan Engineering Co.
Consulting Engineers
Salina, Kan.

The Authors' Reply — High temperature hot water as a main heat source was considered during early planning for these base facilities. The choice of steam was made on the basis of economy.

Water for all uses at Thule was to be supplied by tank truck, requiring around the clock operation of a large fleet of heated tank trucks. Adding the volume necessary for hot water heating to the existing water supply problem would have necessitated costly construction of distillation plants for sea water and, consequently, would have delayed the program which required an operational airfield at the close of the first short construction season. Further, recruiting and training personnel to operate and maintain this distillation equipment and high pressure pumping units for a remote overseas location would have been more difficult than for the operation of a steam plant.

Nelson E. Pearsall
Chief Mechanical Engineer
and
Wallace O. McClune
Chief Architect
U.S. Army Corps of Engineers
Eastern Ocean District

Does Condensation Problem at Thule Mean Heating System Is Inadequate?

The Thule Air Base installation is most interesting due to the problems involved in its heating. A comment which was made by comedian Bob Hope on a recent television program raises a question in my mind whether the original heating system still is adequate.

As I remember it, Mr. Hope's comment was "This is the first building I've been in where it rained inside when the sun was shining outside."

It would seem that the most likely cause of "rain" inside would be condensation on the wall and ceiling members of the building, especially a structure which contained an occupancy such as would a theater.

The extreme conditions described in the article include greater differences in moisture vapor pressure differential to an extent where it would seem necessary to almost hermetically seal any hygroscopic structural elements or insulating material in order to preserve a given U value. Assuming that the capacity of a heating installation were based on a U value for the structural panel in a relatively dry state, the addition of even slight amounts of moisture would increase this value very materially in a relatively short time. The cumulative effect of moisture absorption by material in the panels could in time cause these to be filled with ice, which when melted could cause structural damage.

I would be interested in knowing more about the construction of the panel material, since a similar problem exists in connection with prefabricated cold storage and refrigeration for use in tropical areas.

Thomas H. Urdahl
Consulting Engineer
Washington, D.C.

The Authors' Reply — It does "rain" indoors at Thule, but this does not necessarily mean that the heating system is inadequate. The dripping which has occurred in buildings at Thule and at other arctic locations is the result of considerable condensate buildup and icing within the wall and ceiling panels. This is caused by moisture migration and, therefore, is a moisture barrier problem.

Because of this, some delamination and structural damage has taken place. But the icing in the panels has never reached the point where the heating system at Thule could not meet the demand — even at −40 F outside temperature. Unfortunately, this has not been true at all arctic installations.

Due to decreased insulation efficiency, ice filled wall cavities, and inside "rain," our architectural section has instituted an extensive field and laboratory investigation of the vapor barrier problem in arctic construction. We hope to have a practical solution to this problem in the near future.

Nelson E. Pearsall
Chief Mechanical Engineer
and
Wallace O. McClune
Chief Architect
U.S. Army Corps of Engineers
Eastern Ocean District

Correction

Table 2 in the article, *What to Consider When Designing, Fabricating Pressure Piping,* in the February issue, contains an error as follows: On page 89 under the heading "3. Design, Limitations for branch connection reinforcement, Fillet welded local reinforcement plates, saddles, etc.," where it reads, under Class II, "Not permitted for d/D 0.5," it should read "Not permitted for d/D *over* 0.5."—Ed.

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Question of the Month

How Many Manhours Required For HPAC Installation Work?

This question was asked previously in Heating, Piping & Air Conditioning and is repeated here, along with one answer that has been received. Other answers or comments for publication are invited.

"How many manhours may be estimated for cutting, threading, welding, and installing piping of various sizes? I am interested in obtaining this information for modification of heating, piping, and air conditioning systems in an industrial plant.

"Also, I would like to have manhour values that have been established for insulating piping and assembling and erecting ductwork."—W.W.G.

Personnel, Work Area, Accessibility Govern Installation Manhour Output

TIME REQUIREMENTS for performing the operations described by W.W.G. are influenced to some extent by the skill of the labor. If the work is to be undertaken by plant personnel, greater time may be needed, since these people usually do not have the experience possessed by craftsmen practicing their respective trades.

If the work is to be performed in areas where plant operations are being conducted at the same time, it may be necessary to limit the amount of activity in these areas to avoid interferences. Whether fabrication of pipe and duct systems takes place in a shop or in the field also influences time needs. If the systems are located so high as to require ladders and scaffolding, more time will be required, obviously. If piping can be prefabricated in a shop with a minimum number of assemblies erected in the plant, considerable savings may be obtained as compared with time needed for field fabrication and assembly. Coordinating these operations before the work begins will help reduce required time and offer substantial savings.

Table 1 lists estimated manhours required for performing the piping operations mentioned by W.W.G. This data is for sizes frequently installed in industrial plants and includes most operations required for fabrication and installation of pipe, fittings, valves, and other accessories.

Table 2 gives similar data for applying pipe insulation. The information given is for standard weight 85 percent magnesia, with glued canvas jacketing. The tabulation does not include values for flanges, flanged fittings, nor flanged valves. Since this is highly specialized work, it is possible that it must be performed by persons skilled in the application of pipe insulating materials. The tabulated information is predicated upon

TABLE 1—ESTIMATED MANHOURS required for performing piping operations given here for pipe sizes most frequently installed in industrial plants

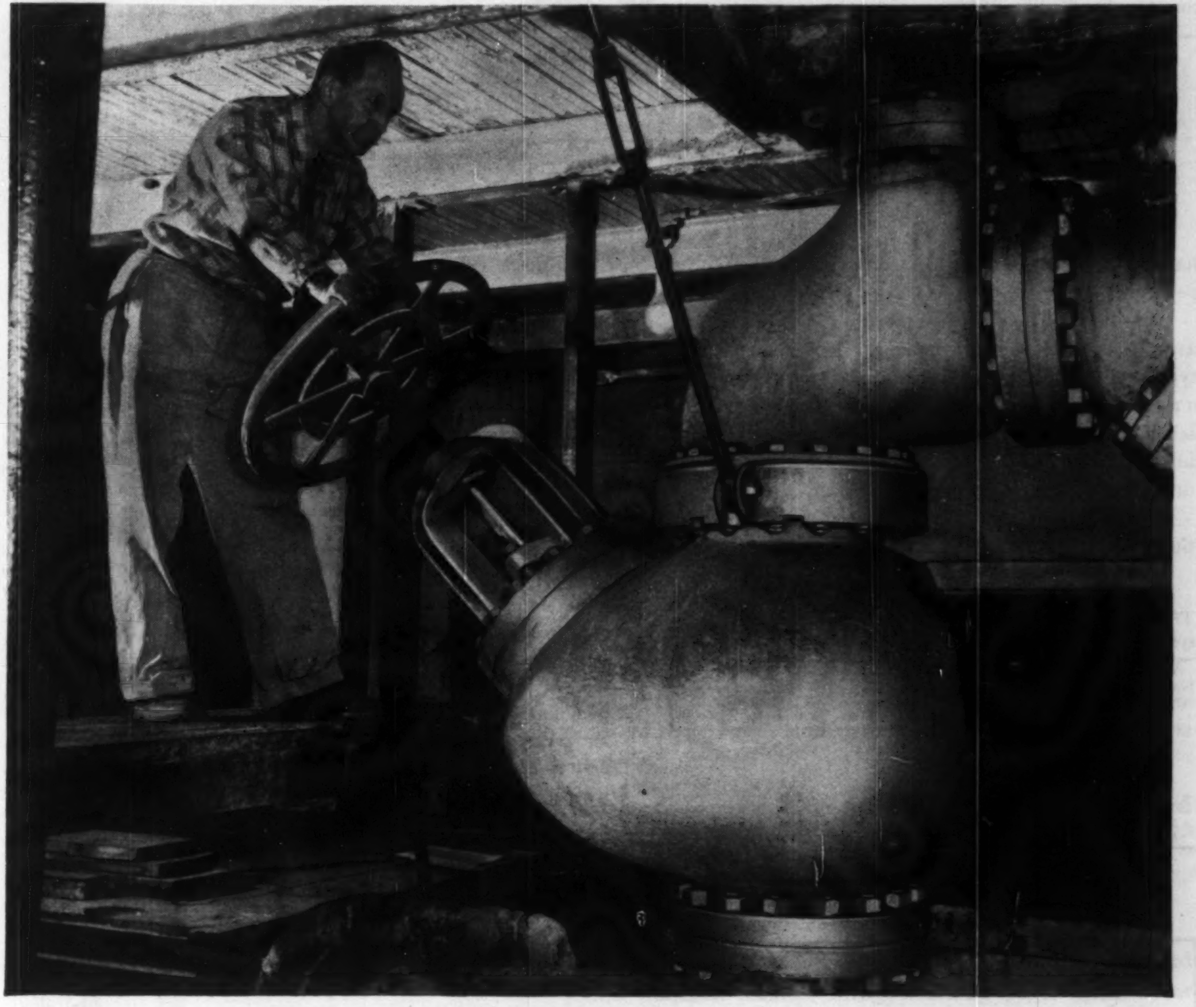
Operation	Nominal pipe size, in.										
	½	¾	1	1¼	1½	2	2½	3	4	6	8	10
Piping[a]	15	16	18	27	34	45	48	51	60	84	123	169
Welding fittings[b]	0.4	0.5	0.6	0.8	1	1.5	2.5	3	5	7	8	10
Flanges[c]	..	..	0.5	0.8	1	1	1.5	2	3	4	5	6
Screwed elbows[c]	0.5	0.5	0.8	0.8	1	1	1.3	1.5	2	4	4	6
Screwed tees[c]	0.6	0.6	1	1	1.3	1.3	1.6	1.9	2.6	5.2	5.2	7.8
Valves	1	1	1.8	2	2.5	4	5	7	9	12	15	18
Field welding[b]	1	1	1.5	2	2	2	2.3	2.6	3	4	5.2	7

[a] Time for piping operations expressed as manhours per 100 ft of pipe. Includes handling from truck or rail siding to job site, cutting, threading, flanging, and welding.

[b] Sizes ½ through 2 in. socket welded, 2½ in. and larger butt welded.

[c] Includes handling and making joints.

Crane Valves Pay for Themselves in Trouble-Free Maintenance



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This remarkable case history proves how the right valve can save money in repairs and maintenance—again and again.

This Crane 10-inch stop-check valve has been in use since 1906 at Seattle Cedar Lumber Mfg. Co., Seattle, Wash. Operating at 360° F. and 150 psi., the valve is closed every third or fourth night when one of 3 boilers is shut down. The valve is also closed every 3 weeks when the boiler is down for inspection and cleaning. About a year ago, this Crane No. 28E Ferrosteel valve was opened for inspection, cleaned up, and put back into service. Repair parts needed? None.

In short, all 50 years have done to this Crane valve is emphasize how rugged and dependable it has proved, and how important it is to use quality valves on every service. For complete information on any valve problem, contact your Crane Representative.

YOU'LL FIND GOOD tips on valves in "Valve Performance Facts"—32 case histories throughout industry. Ask your Crane Man for a copy or write to address below.

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TABLE 2—APPLYING PIPE INSULATION requires the following estimated manhours. Pipe sizes are same as in Table 1, to aid in estimating time requirements for complete installation

Operation	Nominal pipe size, in.											
	½	¾	1	1¼	1½	2	2½	3	4	6	8	10
Pipe[a]	6.5	6.5	7	7	7.5	7.5	8	8	9	10	10.5	12
Fittings[b]	0.25	0.25	0.25	0.3	0.3	0.35	0.4	0.5	0.6	0.8	1	1.2
Valves[c]	0.25	0.25	0.25	0.3	0.3	0.35	0.4	0.5	0.6	0.8	1	1.2

[a] Time required for applying insulation to piping expressed as manhours per 100 ft of pipe. This includes glued canvas jacketing.
[b] Screwed and welding end fittings.
[c] Screwed and welded end valves.

having the operations performed by such experienced personnel.

Costs for fabricating and erecting piping systems are usually based upon material requirements and type and number of operations. As an example: for a run of pipe, including fittings, valves, and insulation, labor cost includes preparation of pipe ends, preheating, welding, post heating if required, grinding, threading, assembly, and other operations.

Table 3 gives estimated installed costs for pipe, fittings, valves, and thermal insulation for various sizes.

TABLE 3—ESTIMATED INSTALLED COSTS for piping systems (material and labor combined)

Nominal pipe size, in.	100 ft of pipe and fittings[a]		100 ft of 85 percent magnesia	Cast steel flanged Gate Valves	
	Standard weight	Extra heavy	400 to 500 F	150 lb	300 lb
1	$195	$240	$195	—	—
2	318	376	222	—	—
3	455	565	240	$127	$195
4	650	780	292	182	246
6	1080	1300	390	260	390
8	1650	1950	495	364	585
10	2270	2600	650	540	843
12	2370	2920	715	585	1080

[a] Fittings comprise one tee and two elbows.

Since these values are influenced by material quantities, plant location, and prevailing labor conditions, this is given only as a guide as each project or installation will be influenced by local conditions.

Estimated time needs for fabricating and erecting ducts are expressed as a function of duct weight, or in manhours per pound. Time for fabrication may be calculated based on 0.05 manhours per lb. Erection requires approximately 0.10 manhours per lb. Knowing the respective metal gages, corresponding weights can be estimated and applied accordingly. The data may be used for both rectangular and circular ducts.

As stated above, the skill of the personnel, the available working area, and the accessibility have a decided influence upon time requirements for performing this type of work. W.W.G. has not indicated whether plant personnel or outside contractors are to be employed. He must consider this carefully when preparing estimates, as these values may be somewhat higher for less skilled craftsmen.

H. B. Wayne
Consulting Engineer
Woodhaven, N.Y.

READER ASKS—

"How Do Wind Loads Affect Stability of Pipe Supports?"

"We understand that wind loading on pipes is often included in some general provision for lateral stability in designing the supports for partially shielded piping. How to include these factors in the design of such piping is of real interest to us. What shielding effect from the wind, if any, can be expected from one pipe on another which has been placed behind it? A brief statement of our immediate problem is as follows:

"The pipe supports will carry 60 pipelines varying in diameter from 2 to 6 in. This will be arranged in four layers and will cross an open field.

"The locality is subject to hurricanes. Therefore, we have been using a design wind velocity of 120 mph.

"The pipelines will be subjected to no thermal expansion, as very little temperature change will occur during or prior to their use.

"All piping will be supported by precast concrete supports, with bell bottom foundations spaced 20 ft apart.

"The pipe load will be transmitted through guides to the supports. Pipes should be anchored firmly so that they cannot be blown off their supports. The lowest layer of pipe is to be 20 ft above the ground, with 4 ft between pipe layers.

"We feel that the wind loading and the effect of one pipe shielding the other is critical in the design of the supports. We would like to have information that will provide a firm basis for assuming wind loads on this type of installation." — D.S.F.

- *YOU ARE INVITED to contribute a question for publication or an answer to a published question. Write: The Editors, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.*

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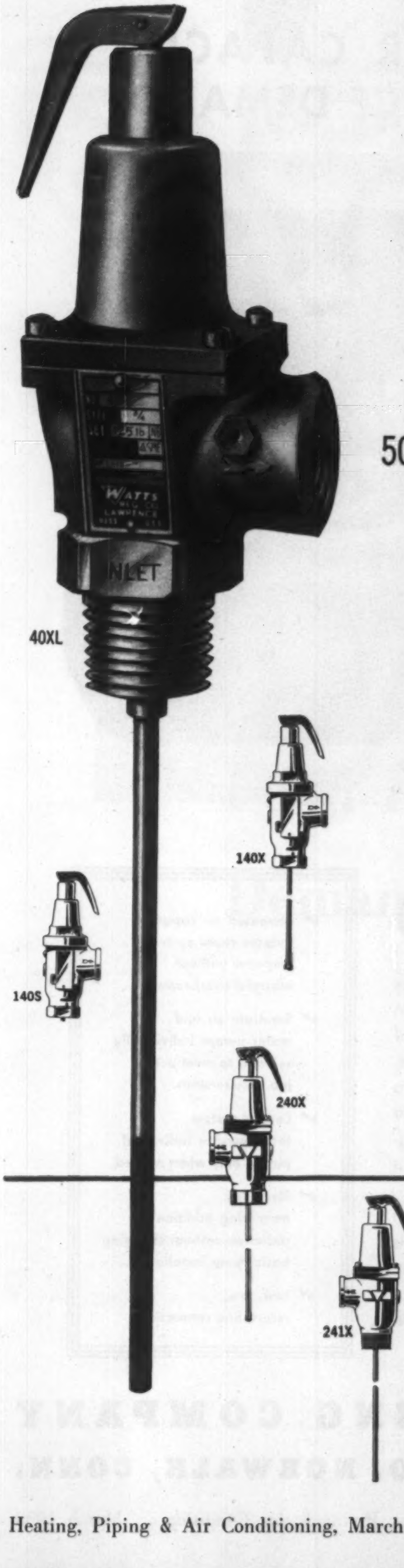

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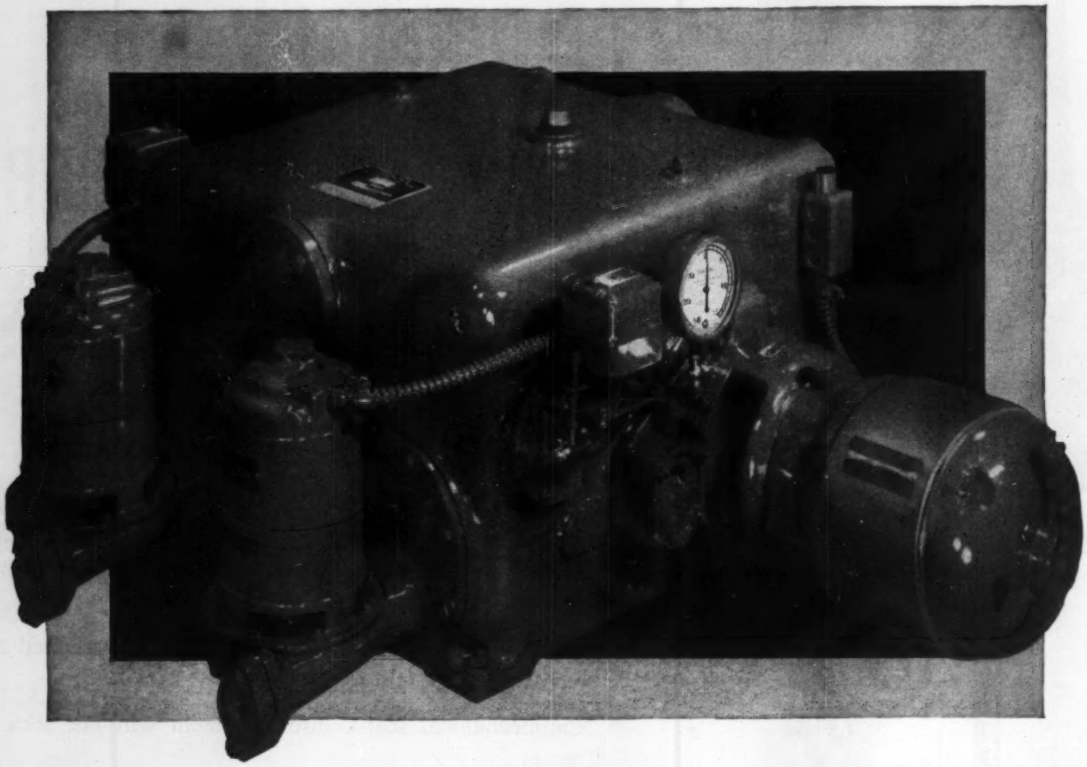

It's the Nash CSM

Designed and manufactured by the organization that made the Jennings Manifold Heating Pump standard of the Heating Industry, the new CSM incorporates every desirable feature architects, engineers, owners and operators have sought. Employing separate air and water pump elements, each with its own motor and each independently controlled by its own automatic switch, the capacities and arrangement may be widely varied to meet job conditions. For the first time, the engineer has the choice of realistic water and air capacities required for rapid system response without wasteful overheating.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- ✓ **Increased air capacity induces rapid system response without wasteful overheating.**
- ✓ **Separate air and water pumps individually selected to meet actual job requirements.**
- ✓ **Control system that operates individual pumps only when needed.**
- ✓ **Flexibility permitting addition of radiation without changing basic pump installation.**
- ✓ **Low, low, return line connection.**

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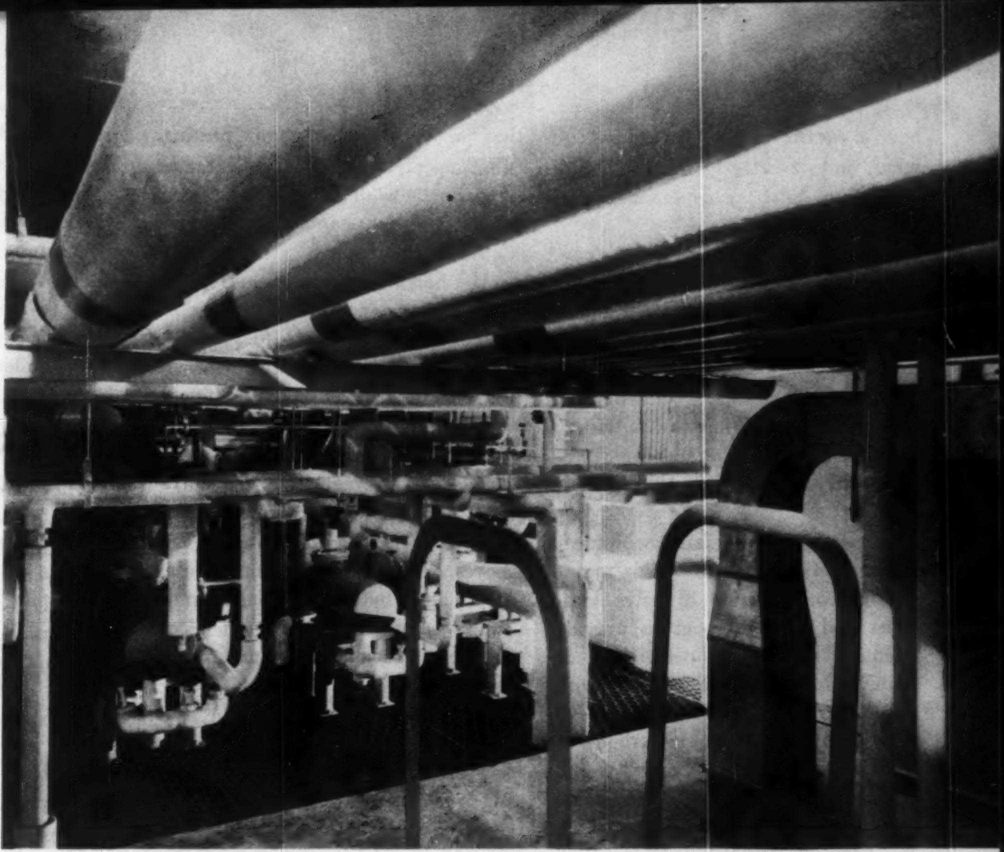


BOILER ROOM MEZZANINE contains two 3700 gal hot water storage tanks, instantaneous water heaters, shown, which supply hot water to process equipment. Note large trapeze hanger for supporting piping. Stripes identify piping services

Food Process Operations Demand Maze of Piping

. . . to serve variety of applications. Milk plant's design requirements were that systems operate automatically, be easy to maintain, be sanitary and neat appearing. Grouping of pipe solved installation problem.

BY ROY M. LAZAR
Chief Mechanical Engineer
Carnation Co.

CARNATION Co.'s recently completed fresh milk and ice cream plant in Seattle features a variety of process piping systems. Enclosing 111,509 sq ft of floor space, this newest of the company's facilities is a two-story structure which houses processing, office, and warehouse areas. It is capable of producing 40,000 gal of milk per day and 3 million gal of ice cream per year.

Complex piping serves four separate water systems for various applications, a general purpose air system, a control air system for instruments and agitation of raw milk, and ice cream batch mixing and paper milk carton coating systems.

Basic to the design of all systems were the following objectives:

1) Through the use of automatic controls, make efficient use of power and fuel consuming equipment. The nature of the loads is characterized by wide fluctuations with short peaks. Manual operation could not be relied upon to meet these conditions.

2) Design piping and equipment for ease of maintenance. This meant careful consideration of valve locations and piping layout to provide adequate shutdown for maintenance with minimum interference with plant operations.

3) Provide for latest methods of sanitary construction and overall pleasing appearance. Piping and equipment were designed accordingly. Careful attention was paid to grouping of pipes for neatness and orderliness.

Supply 16,000 Lb per Hr Steam

Two forced draft, packaged, water tube boilers each with a maximum continuous capacity of 16,000 lb per hr of saturated steam, supply steam for various processing equipment, hot water systems, and heating. Working pressure is 150 psig. Firing is normally with natural gas. Heavy oil is used for standby in case gas service is interrupted.

The boilers' automatic controls are of the ratio type. This type was selected as it best meets the requirement for maximum efficiency where the load is not constant and fluctuates rapidly.

Feedwater for the boilers is conditioned to prevent scale and corrosion. Makeup water is softened, and a deaerating feedwater heater removes oxygen. Further conditioning is provided by chemical feed pumps which supply conditioning chemicals to the feedwater storage tank and direct to the boilers.

Condensate is returned to the feedwater heater by separate high and low pressure condensate return piping systems. All condensate from drips on steam mains and equipment operating at boiler pressure is conveyed through the high pressure systems, while that from equipment operating at reduced pressures travels through the low pressure system.

Standard weight black pipe is used for all steam and condensate piping. Joints for pipe sizes 2 in. and larger are welded. Sizes $1\frac{1}{2}$ in. and smaller are joined with screwed type fittings.

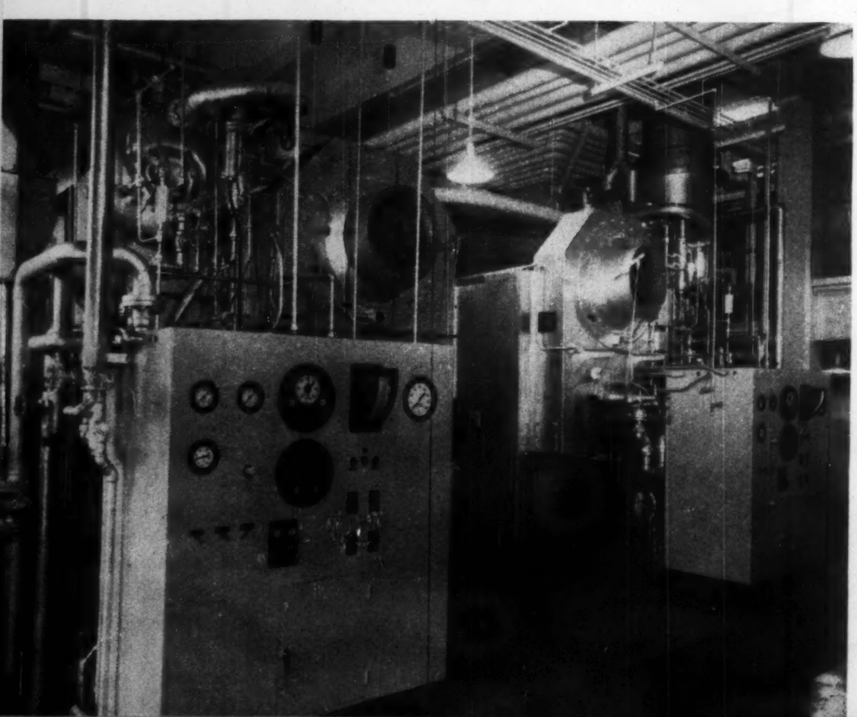
For the convenience of the boiler room attendant, the boiler stop valves and other main stop valves are located on a floor mounted main steam header. This steam header is centrally located so as to be readily accessible. A sink and chemical test cabinet are located in the boiler room, also, for ease in testing the condition of the boiler water.

4 Separate Water Systems

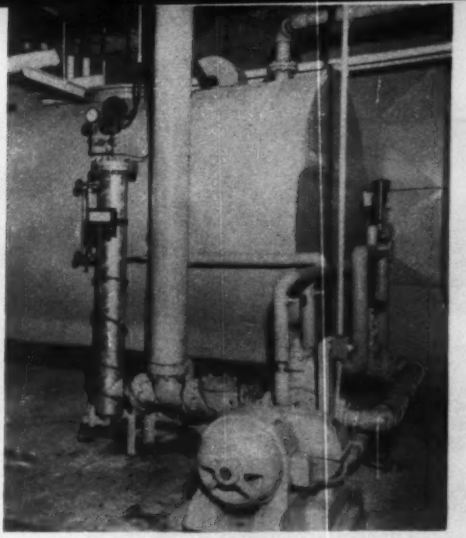
The plant utilizes four separate water systems: cold, hot, process cold, and hose rack hot. Water for these services enters the building at a single location. The 125 psig city water pressure is reduced to 60 psig for plant usage.

The cold and hot water systems are connected directly to the city water system, whereas the process cold water and hose rack hot water are separated from the city system by back flow preventers.

These back flow preventers are required because the equipment connected to those systems constitutes a cross connection hazard. By connecting all this equipment to one piping system, the use of a single back flow preventer is permitted. To connect them separately to the city water supply would have required an individual preventer for each item connected.



TWO PACKAGED BOILERS provide 32,000 lb per hr steam for various processing equipment, hot water systems, and heating. Ratio type automatic controls permit maximum efficiency under fluctuating loads



CORN SYRUP is stored in 3000 gal tank, pumped to point of usage in ice cream plant by positive type pump. Some piping is electric heat traced, and syrup piping is steam heat traced to maintain syrup at 110 F

The back flow preventers facilitate the operation of their associated systems at practically full city water pressure.

The cold water system supplies water for the two hot water storage heaters. These heaters have a storage capacity of 3700 gal and a recovery rate of 3500 gph each. Water is maintained at 140 F.

The hot water from the tanks is divided into the hot water system and hose rack hot water system. The former supplies domestic hot water, while the latter supplies the various hose racks installed throughout the plant and the outside yard area. The process cold water system supplies water to hose rack stations and other equipment where the water must not be cross connected with the city water system.

Piping materials used for these four systems are standard weight galvanized pipe with screwed joint fittings. All valves are bronze in the smaller sizes, and iron body with bronze trim in the larger.

Control Chilled, Tower Water

The chilled water system provides 34 F water for cooling milk, ice cream mix, and milk byproducts. Most of these products must be cooled to 38 F. Because of the low split between coolant and product cooled, heat transfer equipment has large surface areas and requires high circulation rates.

To insure adequate circulation through the various loads, to keep operating costs at a minimum with the number of pumps used, and to maintain system balance through a wide range of fluctuating loads, an automatic control system is used.

This system comprises three pumps each having a capacity of 350 gpm at 75 psig. Automatic control maintains a pressure of 70 to 75 psig in the supply main. Pumps turn on and off automatically to meet the load requirement. Incremental load steps between the capacity of any two pumps are met by bypassing from the supply to the return main the excess in capacity, thereby maintaining the supply pressure constant.

The tower water system is laid out similar to the chilled water system. Each of three circulating pumps has a capacity of 200 gpm at 75 psig. The control system itself functions in the same manner as that for the chilled water.

The chilled water cooler and cooling towers are on a roof level equipment deck. The chilled water cooler is an open type because of the low temperature chilled water required. This equipment is enclosed in an insulated room.

The cooling towers are outside the plant on the roof. Two cooling towers are used in conjunction with the three tower water pumps. In order to maintain proper circulation over the towers, one tower is out of service when only one pump is operating. Both towers operate when two or three pumps are on. The water basins of the two towers are connected to keep the water levels balanced.

All equipment using chilled or tower water is provided with controls for adjusting and maintaining the proper flow rate. Equipment that cannot operate at 75 psig has pressure reducing valves installed.

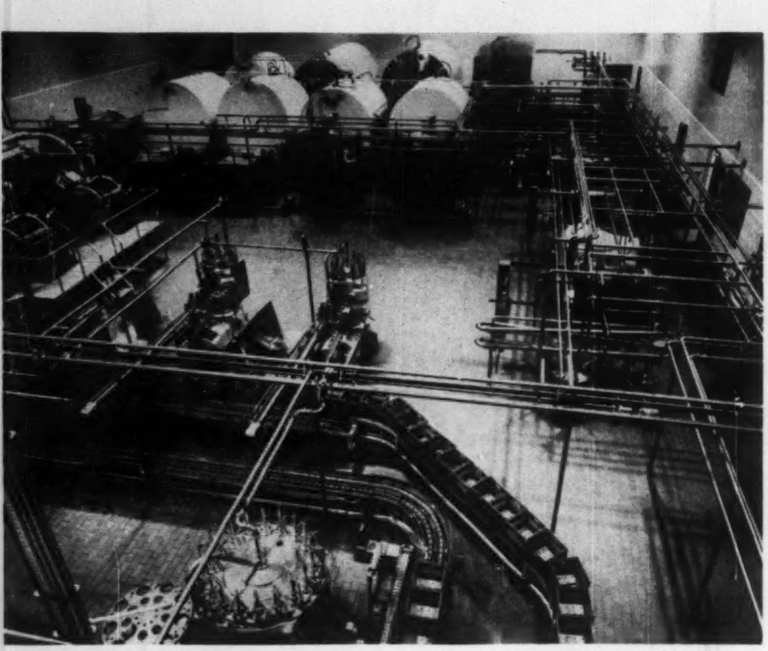
Where these are required, adjustment of flow rate is accomplished by reducing the inlet pressure, noting the outlet pressure, and then adjusting this differential pressure to the manufacturer's specifications.

Where reducing valves are not required, adjustment of flow rate is accomplished by adjusting a flow control valve on the outlet. By observing inlet and outlet pressures, the flow control valve is adjusted for the correct differential pressure. Differential pressure controllers could have been used for more precise control, but were not deemed necessary since the supply pressure is held constant and the return pressure fluctuation is minor.

Control Air Cuts Maintenance

Two separate air systems provide general purpose air and control air. The control air system supplies air for all critical control instruments and for air agitation of raw milk. The general purpose air system supplies air for all remaining uses.

The control air differs from the general purpose air in that the compressors used are of the nonlubricated type. It, therefore, is oil-free.



MILK PROCESSING ROOM meets stiff cleanliness requirements. Milk and its byproducts travel through polished stainless steel piping, termed by dairy industry as "sanitary piping"

This is a distinct advantage for use with automatic controls, as oil-free air can be expected to reduce maintenance considerably.

Control air pressure is maintained between 60 and 80 psig. This system comprises three 3 hp compressors, each a self contained unit with aftercooler and receiver. Tower water serves as the coolant for the aftercoolers. A separate pressure switch controls the start and stop of each compressor. The settings of the pressure switches are staggered to provide capacity variation with load requirements.

Proper maintenance of these compressors dictates replacement of carbon piston rings after a number of hours of operation. Initial experience will indicate the optimum time before replacement. Time meters are installed to log the hours of operation for each compressor. Because the operation hours of each compressor will not be the same, a selector switch is incorporated to change the sequence of operation. This helps maintain uniform operating time for all three compressors.

General purpose air pressure is maintained between 110 and 125 psig. Two 15 hp compressors are used, each of which is again a self contained unit with receiver, aftercooler, and pressure start-stop switch with staggered settings.

Boost Efficiency, Reduce Costs

Miscellaneous piping permits corn syrup, liquid sugar, and liquid wax to be piped to their points of usage. This facilitates efficient operation and permits these products to be purchased in large bulk quantities, thereby providing considerable savings in their costs.

Corn syrup and liquid sugar are used in the ice cream plant as ingredients for ice cream mix. These are stored in tanks located on the second floor and are pumped down to the main floor where they are metered into the mix.

Liquid sugar is stored at room temperature in a 6000 gal steel storage tank with a special protective coating on its interior surface. The pump is an all bronze positive type unit. All piping is copper tubing joined by means of sweat joints. Valves are gate type, all bronze.

Corn syrup is stored in a 3000 gal tank and is maintained at approximately 110 F by a steam coil in the tank. The tank is of black iron construction and it too has a special coating on the interior surfaces. A positive type pump with bronze fittings pumps the product to the first floor points of usage. Piping is galvanized iron.

The suction piping between the tank and pump and the expansion chamber on the discharge side of the pump are steam heat traced. All the remaining pipe is heat traced with electric cable. The electric heat traced portion of the piping and the storage tank are thermostatically controlled, while the steam heat traced piping is controlled manually. The latter is used only for startup after long periods of shutdown.

Liquid wax, used for coating paper milk cartons, is piped to the machine performing this operation. The wax is stored in a double compartment tank. Each compartment has capacity for 3000 gal and is large enough to receive a tanker load. The two compartments are required so that a new shipment of wax can be stored in an empty compartment and not be mixed with the remaining supply. (This is necessary as wax may become oxidized with prolonged storage at elevated temperatures.)

The tank is made of black iron and is enclosed with a steel jacket. An air space separating the jacket from the tank is heated and thermostatically controlled to maintain the wax at the correct storage temperature. A nitrogen blanket is maintained over the wax to keep out air, both for fire protection and to minimize oxidation.

The piping from the storage tank to the points of usage is aluminum tubing with special couplings at the joints. The piping is electrically heat traced. Thermostats maintain the proper temperature.

Ease Installation of Piping

Due to the multiplicity of piping, care was taken to group the pipe runs, mains, and branches as much as possible. This simplified the hanging problem, permitting each hanger to support numerous pipes; gives the installation a neat and workmanlike finished appearance; and simplifies the interference problem with other services, i.e., electrical conduit, plumbing, and heating and ventilating ducts.

Trapeze type hangers are used almost exclusively. These are made from variously sized angle iron for horizontal members and variously sized rod.

Hangers are spaced on a maximum of 10 ft centers and are strong enough to support several men. The erection technique was to install the hangers first, and then lay up the various straight sections of piping. The remaining joints were made in place.

All piping which carries products maintained at above or below room temperature is insulated. This piping is neither fastened to hangers nor anchored, but instead "floats" on its hangers. This type of hanging is permissible since there are no excessive temperatures, nor are there any long pipe runs without sufficient changes of direction. The only lines that are actually fastened to the hangers are the air and liquid sugar lines.

Hangers for all horizontal runs are set at the same elevation. Where a pipe changes size, eccentric reducers are used.

To properly remove condensate from steam lines, drips are placed at all changes in elevation and at the ends of all lines.

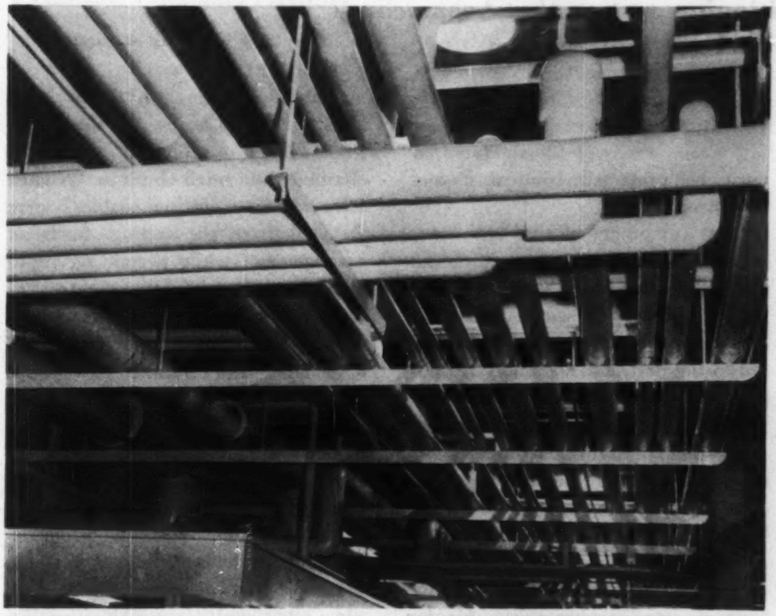
Meet Special Insulating Needs

Insulated pipe is supported from hangers through the insulation. This required selection of an insulation which would have sufficient bearing strength to withstand the weight of the pipe. A galvanized steel saddle which covers one-half the outside of the insulation is placed between the insulation and hanger. This saddle is not fastened to the hanger, but is left free to move with the pipe.

All hot lines are covered with a calcium silicate type of insulation. In addition to having sufficient bearing strength, it also retains its strength well when wet. (Some piping is located in very wet areas, and although the pipe insulation is waterproofed, the insulation in time may get wet.)

Water lines, except those for chilled water, are covered with anti-sweat insulation. As all process areas are very moist, this covering prevents excessive condensation on these lines.

Chilled water lines are covered with foamed plastic insulation.



MULTIPLICITY OF PIPING to serve plant operations posed installation problem. Runs, mains, branches were grouped as much as possible, permitting each trapeze hanger to support numerous pipes

Pipe Milk Via Stainless Steel

Pipe and fittings for milk and its byproducts are of Type 304 stainless steel which has been polished to a No. 4 finish. Fittings are of the standard dairy type which are easily disassembled. All pipe and fittings and installation of this system conform to the U. S. Public Health Service requirements. All such piping is termed by the dairy industry as "sanitary piping."

Union joints are normally spaced at a maximum of 10 ft. This is so that the piping may be easily dismantled for cleaning. Where practical, the piping is laid out to take advantage of "cleaned-in-place" techniques. When piping is cleaned-in-place it is not dismantled for cleaning, but simply cleaned by circulating various cleaning solutions through it. Where this is the procedure, many of the joints in straight runs are welded.

Most of the sanitary piping is located in the milk processing and ice cream processing rooms. As these rooms have high ceilings, about 25 ft, separate hanger pipe networks, supported from the floors, are installed immediately above the sanitary piping.

All hanger pipe is stainless steel with welded joints. This piping supports the sanitary piping and is utilized as the return pipe to complete the circulating system for the cleaning operation.

The sanitary piping is supported from the hanger pipe by hooks. It is laid into the hooks and not fastened, permitting easy removal and re-installation. Hooks are normally placed on each side of the union points. In this manner, each piece of pipe is supported separately and does not depend on fastening to adjacent pipe for any support.

The mechanical (heating, piping, and air conditioning) contractor for this installation was W. E. Beggs, Inc. ǂ

AIR CONDITIONED BUILDING houses aircraft plant's flight test data reduction facilities. Started in 1954, structure was added to in 1956. Air conditioning equipment is on rooftop of original building, in penthouse in later addition

Air Conditioning: Hidden Tool

Electronic computers that process the flight test data necessary to the design of aircraft must keep a cool head to function properly. This critical need is met by a special building which has a unique air conditioning system that keeps computer components operating without interruption.

BY E. W. WINCHESTER
Plant Engineering Dept.
Convair Div.
General Dynamics Corp.

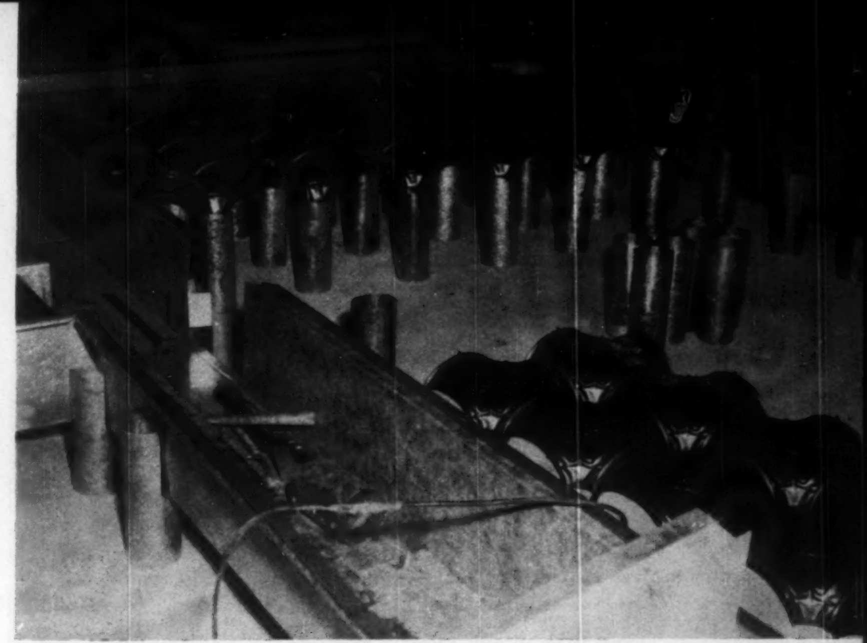
THE DESIGN of supersonic jet aircraft, such as that carried on by Convair at its San Diego plant, is a very exacting profession—so much so that electronic computers are necessary to eliminate laborious and time consuming manual calculation in reducing flight test data.

An electronic computer is a superb worker and, like all good workers, develops heat. This heat must be carried away or the computer's intricate mechanism will be damaged. Also, its delicate contacts must be protected from dust and moisture.

Most computers of this type have built-in safety thermostats which cut off the power when a maximum safe temperature is exceeded. This feature, unfortunately, cancels all data fed to the unit, and the analysis must be repeated. The only answer to the problem of continued operation is an artificially controlled atmosphere.

Convair's San Diego plant has been using computers for over 10 years. The first installation was located in a room in which the ambient air was controlled by package type air conditioning units. Air for the computing components was drawn in through louvers and discharged by small built-in exhaust fans. Interconnecting cables were fastened from the ceiling. Such an arrangement, while permitting rapid hookup, was unsightly. Control of temperature and humidity varied according to the number of occupants.

A later unit installed was built around a raised platform. Conditioned air entered the computer components from the plenum created by the platform. The air discharged from the computers was used to ventilate the room. When the programming personnel were moved into the same room it was necessary to provide additional air conditioning for the room itself. This arrangement proved very satisfactory except that



FALSE FLOOR, made up of series of miniature columns and groined arches, provides plenum for cooled air to be supplied to computers at desired locations. Forms are light gage sheet metal stamped with irregular surfaces

In Modern Aircraft Design

the computer components were rigidly fixed in one position.

Expansion Outmodes Facilities

In time, as the plant was expanded so was it necessary to expand these data reduction facilities. It was decided that a separate structure be erected to house this operation.

In planning for the air conditioning of this building, parallel installations at Convair's Pomona, Calif., and Fort Worth plants were studied. These confirmed the successful use of false floors for use as supply plenums, a separate air exhaust duct system for the computers, and a separate air conditioning system. So, in 1954 design was started for a separate building to house the first increment of the flight data reduction equipment.

The building is a 40 ft wide by 60 ft long, two-story, reinforced concrete structure with blank exterior walls. It adjoins an existing engineering building.

The delicate nature of the computing equipment prohibited the use of a conventional fire sprinkler system. Consequently, the building had to be designed for the highest degree of fire resistance.

Air conditioning equipment is located on the roof. Three package type air conditioners with dry expansion refrigerant coils are served by a single 40 ton compressor and evaporative condenser.

False Floors Aid Flexibility

The floor of each story is bisected, one-half containing a false floor. After many studies were made, a concrete floor made up of a series of miniature columns and groined arches was selected. Forms are light gage sheet metal stamped with irregular surfaces to provide a high degree of rigidity. They were simple to place on the structural slab, and a minimum of bracing was required.

Holes for air distribution to the computer components were formed either prior to pouring the concrete or were chipped out later. This construction provides for the easy relocation of all electronic computer components. The finished construction provides a false floor combining the maximum of strength, flexibility, and fire resistance.

Separate ductwork is installed to handle the exhaust air from the computer components. Relocation of components requires only minor changes in this duct system.

Room design conditions are 73 F and 50 percent relative humidity, while maximum computer design conditions are 85 F and 30 percent RH. Permissible variations from design conditions are great enough to permit the use of electric modulating controls. Heat radiated from the computers is sufficient for satisfying the comfort heating requirements during the winter.

New Computers, New Needs

In 1956 an addition was made to the original building. This new section is 40 ft wide and 80 ft long. The nature of the newer computing equipment installed demanded more clearly defined design conditions, along with closer tolerances. Furthermore, the equipment requires frequent relocation to secure the many possible combinations of components.

The air conditioning equipment is in a penthouse. All air conditioning units include outdoor air intakes and plastic type filters. The same type of air supply system as in the original building is used, but both room return air and equipment return air exhaust into a common duct.

The new area is split into six zones: two equipment cooling, two equipment room ventilating, and two programming room ventilating. The programming room ventilating zones are served by small package type units, each with combination cooling and dehumidifying coils, heating coils, a humidifying spray, and a blower.

Good Humidity Control

The main zones are conditioned by two custom built units. Each unit conditions the air for the equipment and the equipment room for one floor. The mixed air passes through a dehumidifying coil in which the degree of dehumidification is controlled by the positioning of coil-face and bypass dampers. Air flow is then split, and the equipment air and equipment room air pass through their respective cooling coils. The room air section contains a steam heating coil and a humidifying spray. Both sections include blowers.

An advantage of this type of unit is its flexibility with respect to humidity control. The mixtures of outdoor and return air generally contain a minimum of a slight excess in moisture. The four row dehumidifying coil processes the air to the proper condition for equipment atmosphere. Only a small amount of moisture needs to be added to the room air to satisfy the required condition.

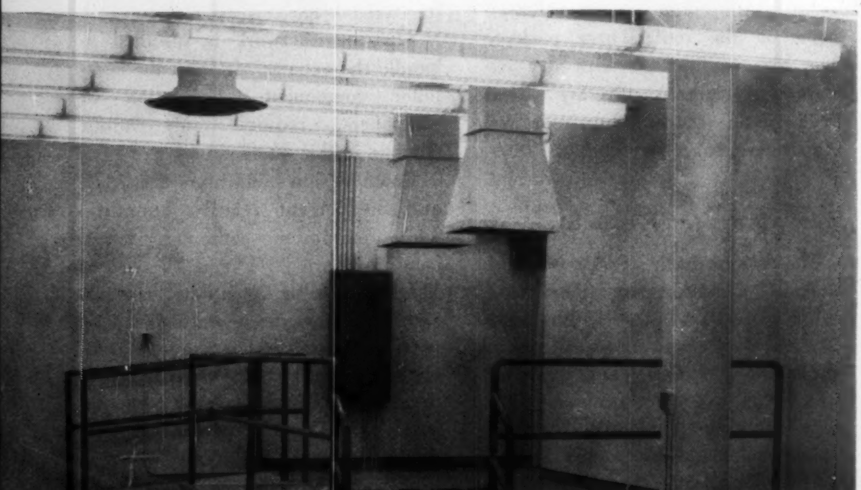
Use Chilled Water For Cooling

The cooling medium is chilled water. Coils discharge into the common pump suction header. Chillers are of the package type consisting of a dry expansion heat exchanger, a refrigerant No. 22 compressor, and a shell and tube condenser with receiver. Secondary cooling is by a redwood cooling tower.

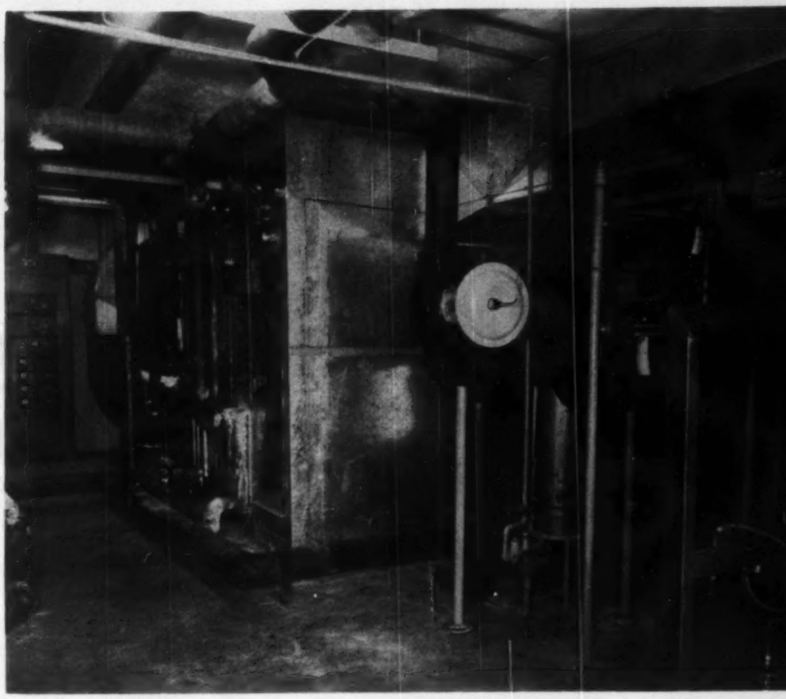
Combat Dry Air Weather Oddity

Occasionally, a "Santa Anna" condition occurs in the San Diego area. This is caused by the moving in of dry, hot air from the desert areas northwest of the city. Mechanical humidification is necessary during this period. This is accomplished with air atomized water jets directed against the cooling coils. Water supply for the jets and for makeup to the cooling tower is furnished by twin water softeners.

The design conditions are as follows: equipment, 85 F dry bulb and 62 F wet bulb; room, 72 F dry bulb and 59 F wet bulb. Under these conditions and for one of the major zones, air enters the plenum ahead of the dehumidifying coil at 79 F DB and 61 F WB. The coil changes this to 76 F DB and 60 F WB. The equipment air cooling coil changes the condition of the air to 66 F DB and 56 F WB. The room air handling coils alter this air to 55 F DB and 52 F WB either by heating or cooling. Minimum dehumidifying is used



RAISED PLATFORM is site for computer yet to be positioned. Note louvered registers in floor, exhaust ducts from ceiling



EQUIPMENT PENTHOUSE in building addition contains one of main zone air handling units, center, chiller, right. Behind chiller are chilled water circulating pumps

to eliminate the need for adding more moisture than is necessary.

Deviation from set temperatures is held to ± ½ F by means of pneumatic controls. Temperatures in the major zones are monitored by two-pen recording controllers. Variations from set points are sensed by the controllers which cause the face and bypass damper operators to reset the amount of air flow across the coils.

Chilled water flows through the coils at a constant rate at all times. The temperature of the water entering a particular coil is controlled according to the function of that coil.

Water to the cooling coils is maintained at 45 F by blending the return water with the 40 F discharge water from the chiller. This is accomplished by a three-way valve. The 40 F water temperature out of the chiller is maintained by a pneumatic thermostat in the warm or return side of the chiller. This thermostat positions an air diaphragm motor which drives a drum switch to actuate the series of four capacity control steps on the compressor. The two chillers operate in parallel. The low suction pressure cutout is automatically reset. Hence, chillers can operate singly or simultaneously. The lead chiller can be preselected and changed at will.

Each chiller compressor has its own condenser circulating water pump. The cooling tower is a redwood slat type with a horizontal draw-through fan. The fan cycles to maintain a minimum cooling water temperature of 75 F. This arrangement provides excellent flexibility of control and prevents cycling of the compressors during periods of low ambient temperature.

Continuous Operation Critical

As stated earlier there can be no failure of equipment or components which would interrupt computer operation. Therefore, all components of the chilled water circuit are in duplicate. Futhermore, all electrical controls are interlocked to prevent faulty operation of one component when a related component shuts down. The operation of the entire system is initiated by the starting of the fans. These are controlled by pushbuttons located in the respective zones.

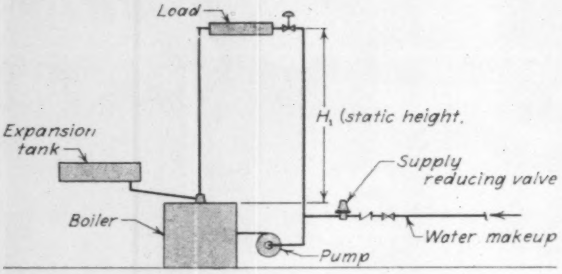
Pressure gages are installed in each run of connecting tubing. This permits the plant's maintenance force to easily track down the source of any trouble.

The important role that air conditioning plays in the operation of the computers is illustrated by the fact that a day's shutdown of the system would mean the loss in computer rental fees of over $1500. Delays in the production of test and design data are of noncalculable importance. Air conditioning, therefore, is a hidden tool in the design and production of modern aircraft.

The air conditioning of the computer facility is but one of many cooling systems installed in the company's San Diego plant. Total installed capacity exceeds 1200 tons. Equipment ranges from ¼ ton air cooled compressors to a steam operated flash chiller unit with a capacity of 268 tons. To date, with the exception of this 268 ton unit, all refrigeration equipment is used exclusively for manufacturing process work and facility cooling. An 1100 ton comfort air conditioning system is now under contract. ‡

This is a second article by the author about the Convair plant. How the installation's steam heating system was revamped was described in the January issue.

Consider Altitude Factor



1 WATER MAKEUP VALVE on boiler maintains constant pressure of water to boiler. Expansion tank keeps pressure in boiler the same. Design water temperature should be kept below 250 F if operating engineer is not on duty

BY JOHN J. BLANK
Swanson-Rink & Associates
Consulting Engineers

Efficient forced hot water heating of a multistory building—via higher design water temperatures and smaller sized piping—demands careful consideration of the altitude at which equipment components are placed. Absolute pressure must not drop below 25 psia. The factors affecting maximum design temperature are the pressure capacity of the equipment, the barometric pressure, the height of the topmost part of the equipment above the boiler, and the effect that water friction has on lowering system pressure.

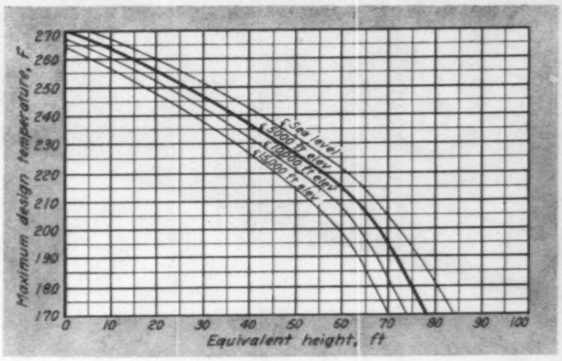
THE CONTINUAL EFFORT to design forced hot water heating systems more economically and to fit them into more modern tight construction clearances has made the use of higher design water temperatures with smaller sized piping desirable. To illustrate the effect of such an arrangement, heating systems having water at 240 F with a 50 F drop require only 40 percent of the water circulated in the common 210 F temperature system designed with a 20 F drop.

This high supply temperature is possible only if the absolute pressure (gage + barometric) is kept from falling below 25 psia in any part of the system under any condition of operation. This is especially important for a building two or more stories high with the pump in the return side of the system.

The use of three-way valves on some of the heating units to prevent pump head buildup will cause the return water to approach supply water temperature during periods of light load. With the pump in the return piping, the pressure in the piping system will be lowered due to pipe friction.

With the water makeup valve on the boiler maintaining a constant pressure, and with the expansion tank also on the boiler, as shown in Fig. 1, it may be noted that the pressure in the boiler will remain the same whether the pump is operating or not. (Since there is no change of water volume in the system, the air cushion in the expansion tank will exert the same pressure on the boiler at all times, provided that the water temperature remains constant.)

In Designing Hot Water Heating



2 MAXIMUM DESIGN WATER TEMPERATURES vary according to elevation and equivalent height of system. Equivalent height is found by totaling static height, friction of water flow, and safety factor

How Is Design Water Temperature Derived?

The following factors affect the maximum design supply water temperature:

1) The water pressure in the boiler should not exceed 30 psig unless high pressure equipment is provided. This equipment should be operated by a licensed engineer. In some areas this may not be an ordinance, but its principle should be followed from the standpoint of safety and future regulations. The pressure of the water entering the building from the street mains should also be checked for sufficient pressure to deliver water into the boiler at operating conditions.

2) The barometric pressure which is governed by altitude above sea level.

3) The height of the topmost part of the system above the boiler (H_1 in Fig. 1).

4) The effect that water friction has on lowering the pressure in the system.

Fig. 2 gives the maximum design water supply temperature as follows.

Example 1

Elevation = 10,000 ft
H_1 (static height) = 40 ft
H_F (water flow friction) = 12 ft
SF (safety factor) = 5 ft

Therefore:

H_{equiv} (equivalent height) = $40+12+5 = 57$ ft

From Fig. 2 (using 57 ft H_{equiv} and 10,000 ft elevation), the maximum design water supply temperature = 213 F.

Example 2

Consider the same H_{equiv} as in Example 1, but at sea level elevation. Reference to Fig. 2 will then give an answer of 225 F maximum design water supply temperature.

How Can Higher Temperatures Be Attained?

To facilitate higher design water temperatures, the circulating pump may be placed on the supply side of the boiler. In this case H_F may be neglected. Credit cannot be given to the pump for raising the pressure at the high point of the system as boiling would result if the pump were stopped. The pump would, of course, have to have bearings and seals designed to handle the higher temperature water, in either case.

Another way of utilizing high water temperatures is by installing the boiler as high as possible in the building. A boiler in a penthouse, for instance, may operate at 250 F with no danger of flashing. With the circulating pump on the return side of the boiler, Fig. 2 still should be checked for the particular arrangement.

Convector heating output may be less at high elevations than at sea level. Approximately 40 percent of heat emitted is by radiation. This portion will not change, but, since no convection is realized in a vacuum, output may be between 40 and 100 percent of sea level rating. An allowance on the safe side would be $0.40 + (P_b/30)\ (0.60)$ where P_b is 30 at sea level, 25 at 5000 ft, or 20.6 at 10,000 ft. This would give a corrected heat output of 100 percent at sea level, 90 percent at 5000 ft elevation, or 81 percent at 10,000 ft elevation.

The above outputs are on the safe side because rarefied air at higher elevations offers lower resistance to flow through the element and, in turn, attains a slightly higher velocity than it would at sea level. The exact amount would have to be determined by actual tests since physical construction and radiating surfaces have some effect on output ratios. ‡

NEW ICE RINK in St. Louis contains well over 24 miles of steel piping. Flow, return connections for each of 461 loops are made to header running length of rink. Shown above is laying of pipe before concrete slab was poured

Miles of Steel Piping Maintain Ice At Air Temperatures to 55 F

. . . in one of the largest outdoor ice skating rinks in the U. S.

BY LOUIS L. HAMIG
Ferris & Hamig
Consulting Engineers

OUTDOOR ice skating rinks are becoming more and more popular, as is evidenced by the Mark C. Steinberg Memorial rink in St. Louis. Opened last November, it met with immediate public acclaim. The skating surface, 120 × 230 ft, is one of the largest in the country.

In designing, it was decided to put as much freezing surface in the rink as practical. An installation of 1¼ in. piping on 3 in. centers was selected. It has proved to maintain good ice even on bright, sunny days with air temperatures up to 55 F.

Close Elevation Tolerances

The entire surface below the rink has 14 in. of crushed rock and 4 in. of sand. Underground drain tile is installed throughout the area and under the pipe tunnel. The piping rests on 5 gage wire cradles which are stapled to 3 × 4 in. timbers that are nailed to leveling posts driven into the ground. The slab is 5½ in. of concrete. The top of the piping is 1½ in. from the surface.

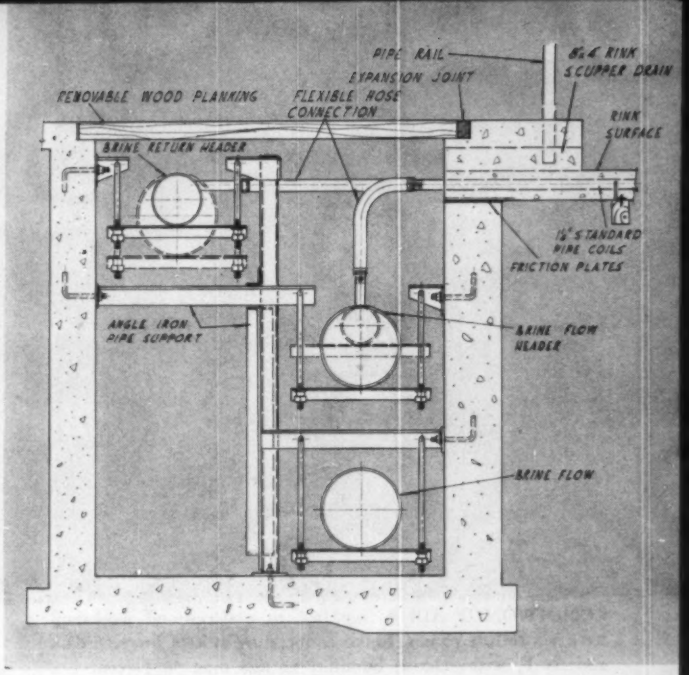
Since the elevations of the slab, pipe, and timbers are critical for providing good ice, they had to be held within ± ⅛ in. from the established elevations. To meet this tolerance, the contractors cooperated to the fullest extent to make sure that there would be no soft areas on the skating surface. Probably the most difficult job was that of pouring the entire concrete surface in one continuous pour.

The piping is installed parallel to the 120 ft length in 922 rows, or in 461 loops. Flow and return connections of each loop are made to a header in the tunnel which runs the length of the rink.

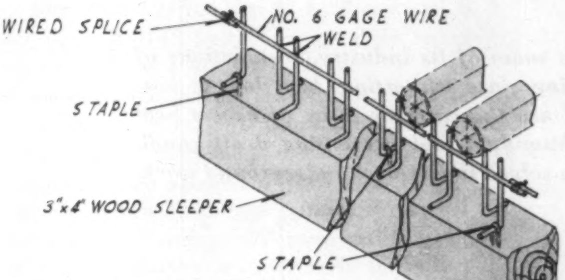
The flow header is a reverse return type. Connections to both the flow and return headers are by means of flexible hose. These flexible connections take up the expansion and contraction of the concrete slab and the piping headers.

In all, 128,917 ft—well over 24 miles—of steel piping is installed, of which 112,578 ft is 1¼ in. size. The pipe coils were fabricated at the site. The pipe was supplied in exact lengths of 40 ft, 5¼ in. to save fabricating manhours.

The pipe was placed on a table made of bar stock for the field fabrication. At the top of the horizontal frame, inverted roller skate wheels were placed. The 40 ft lengths were


PIPE RAIL
8"x4" RINK SCUPPER DRAIN
EXPANSION JOINT
REMOVABLE WOOD PLANKING
FLEXIBLE HOSE CONNECTION
RINK SURFACE
BRINE RETURN HEADER
1¼" STANDARD PIPE COILS
FRICTION PLATES
ANGLE IRON PIPE SUPPORT
BRINE FLOW HEADER
BRINE FLOW

FLOW, RETURN HEADERS are connected to 1¼ in. piping by flexible hose. Connections absorb expansion, contraction in slab and headers. Brine mixing tank is underground


WIRED SPLICE
NO. 6 GAGE WIRE
WELD
STAPLE
3"x4" WOOD SLEEPER
STAPLE

PIPING rests on wire cradles which are stapled to 3 × 4 in. timbers imbedded in sand. Elevations of slab, pipe, timbers had to be held to close tolerance of ⅛ in. to avoid soft spots

then rolled onto the welding table and held in place between the roller skate wheels. Because of wind conditions, the usual gas welding technique was replaced by arc welding.

The welder was able to flex the pipe loop ends up and make two continuous passes at once. The slag was removed by the second pass and no chipping was required.

Choose Centrifugal Plant

Costs and advantages of a multiple ammonia reciprocating brine chilling system were compared with those of a centrifugal refrigerant No. 12 plant. This led to a decision to use a centrifugal machine having a capacity of 400 tons when circulating 4150 gpm of 1.22 specific gravity calcium chloride brine at 10 F off the chiller.

The compressor is driven by a 500 hp, 4160 volt wound rotor motor.

A building adjacent to the rink contains approximately 16,000 sq ft of floor area. It has a stand-up counter lunch room, a skate change room, checking facilities, a concession area, toilet and locker rooms, and an equipment room. Bleacher type seats are on the roof.

Located about 130 ft from the building, the cooling tower is a two-cell unit with concrete basin. It is designed for the usual rink design condition of 45 F wet bulb. The concrete basin has sloping sides and peers to prevent cracking due to freezing. An electrical float switch at the tower controls the makeup water in the equipment room.

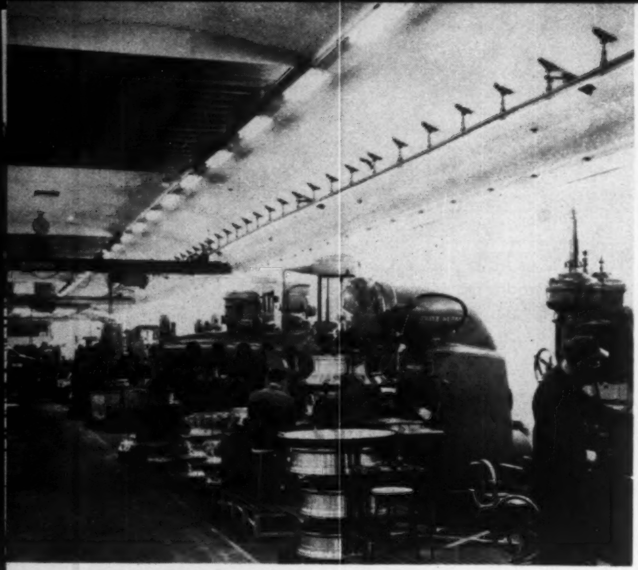
As the tower is situated near a heavily wooded area, trouble was encountered from leaves clogging the strainer in the tower and at the pump. To correct this, screens have been placed over the water distribution system and at the air inlets.

A brine mixing tank is installed underground and has capacity to hold all the brine in the system. A transfer and mixing pump is used for automatic makeup.

Temperature recorders are installed for the brine and condensing water systems and for the outside dry and wet bulb temperatures.

A twin tube, 24 ft sewer is within 100 ft of the rink. Scuppers are provided in the rink curb to drain rain water.

The completed cost of the rink was almost $1 million, including grading, buildings, walks, parking lot, etc. Frederick Dunn was the architect, and R. A. Stencel was the consultant on ice rink details. The piping contractor was Shure-Richardson, Inc.⧧



CONDITIONED AIR is supplied to underground workshop nave via ceiling panels. Room temperature is kept between 64.4 and 68 F, with relative humidity at less than 50 percent

How Underground Workshops Are Made Livable

Sweden has gone underground with some of its industry. Installations of this type require year 'round cooling since wintertime heat loss is low. Some of the problems encountered are the carrying away of excess heat buildup, maintaining low relative humidity, and preventing draft conditions. How these problems have been solved in a typical underground workshop is described here.

BY AXEL ROSELL
Axlander & Rosell
Consulting Engineers
Stockholm, Sweden

UNDERGROUND WORKSHOPS are becoming more and more common in Sweden and providing them with year 'round air conditioning presents problems that are altogether different from those in conventional buildings.

There is no need for heating in winter because the heat loss to surroundings is so low that, as a rule, the heat introduced as a result of lighting is sufficient to overcome the loss. Therefore, it is only necessary to heat the air that is introduced for ventilation.

Since practically all heat generated in the workshops must be carried away, special measures must be adopted if the room temperatures are not to become too great. The method generally employed to accomplish this is to design an air conditioning plant so that the air passing through the room can absorb the heat and carry it away.

There is, however, a practical limit to the amount of heat that can be carried away in this manner. With increasing generation of heat it is necessary to either increase the quantity of incoming air or to lower its temperature. If it becomes necessary to go to extremes in either direction, drafts will occur that may have a disturbing effect on the workers and involve health hazards.

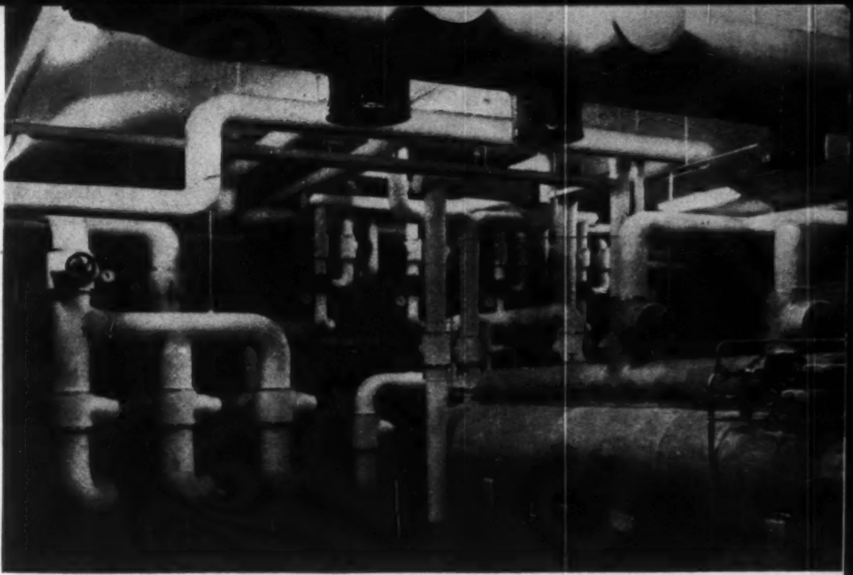
Since all electric energy supplied for lighting and motors to drive machines is transformed into heat, the heat load in modern underground workshops can become considerable. First estimates in a workshop of this type have already showed that it would be impossible to attain suitable working temperatures and avoid drafts using a conventional air conditioning system.

This gave rise to the idea of arranging cooling surfaces within the workshops. For this purpose it seemed suitable to use the concrete vaults which form the ceiling. The ceiling is one of the best areas in the room for radiant cooling as it has sufficient size to provide the cooling effect required without too low a surface temperature. If air alone is used, drafts may occur and too low an air temperature may cause condensation on the cold surfaces.

These difficulties have not been encountered in this installation, because the desired dry bulb temperature and relative humidity of the air in the workshop (68 F and 50 percent RH) gives a dew point of 48.2 F, whereas the surface temperature of the ceiling is estimated to be normally 59 F and not less than 55.4 F.

In order to find out which temperature on the ceiling surface could be permitted without inconvenience to workers, the Physiological Institution at Uppsala University conducted a series of tests in which the influence of a cooled ceiling on a number of persons was studied.

MAIN EQUIPMENT ROOM contains water chiller, right, and cold water piping. System has no boiler plant, uses auxiliary electric heating



This investigation was described in the article, *Radiant Drafts from Cold Ceilings*, by H. E. Ronge and B. E. Lofstedt, in the ASHAE Journal Section of the September 1957 Heating, Piping & Air Conditioning.

The results proved that no inconvenience is to be expected within the prevailing temperature range. This was confirmed by observations made since these workshops came into use about four years ago.

While the system is designed primarily to cool the workshops in a physiologically more satisfactory way than only by air cooling, a closer study shows that the method used also affords a considerable advantage from an economic standpoint. This is true mainly because it is very suitable for utilizing the heat carried away by means of a heat pump system. In spite of the fact that the workshop itself has a surplus of heat, there is during the greater part of the year a demand for heating the outside air used for ventilation. So as not to cause a draft condition, this air must be heated to a suitable inlet temperature — in the present case, to at least 53.6 F, and this requires a considerable amount of heat.

Use Waste Heat Recovered By Heat Pump

Ordinarily, the heat required is generated in a boiler plant. In an underground installation, however, such a plant is very expensive and moreover, the chimney is a detail difficult to hide and to protect in a satisfactory manner. In this case, the major part of air heating is effected by means of the waste heat recovered by the heat pump. This means that the heaters are fed with the cooling water leaving the condensers, which in turn feed the cooling coils in the workshop ceilings.

Since this latter cooling can take place at a comparatively high temperature (about 50 F), also a comparatively high temperature (about 104 F) can be allowed for the cooling water of the condensers with good efficiency maintained. The balance between the amount of heat available in the condensers and the amount required for heating the outdoor air is such that only a small amount of electric energy must be added in order to obtain the required temperature of the outdoor air supplied during the coldest part of winter.

When the demand for heat decreases due to a higher outdoor temperature or a reduced volume of air for ventilation, another condenser is connected which is cooled with water from a nearby water supply.

11 Units Condition Various Points

To prevent humidity from rising above the desired limit and also, on the hottest days, to lower the temperature of air supplied, the plant also comprises an air conditioning plant of conventional type. This consists of 11 separate air conditioning units that serve various parts of the workshops. These units are fed with hot water from the heat pump system and with brine from a special cooling apparatus that is entirely separated from the one for ceiling cooling.

Design for Future Alteration

Keeping the possibility of future alteration in mind in planning the workshops, all ceiling vaults except those covering the central connecting nave, engine room, toilets, and electrotechnical rooms have been provided with cooling coils, regardless of whether or not there is a surplus of heat with present planning.

The possibility of adaptation to the demand for cooling in various parts of the workshops has been effected partly by providing a special cooling water system for each of the seven workshop naves so that the temperature of each system can be varied independently of the others, and partly by subdividing the cooling coils in the ceilings into compartments — about 16 × 20 ft — within which the quantity of cooling water circulation can be reduced or shut off altogether without affecting other parts of the ceiling. If, in a workshop nave which as a whole has a surplus of heat, there is a division with less or no surplus heat at all, the ceiling cooling in that department can be adjusted in accordance with local requirements.

From the outdoor air supply shaft, air flows through a preheater to a central supply fan. This fan, by means of a concrete duct arranged under the ceiling, distributes the air to the 11 air conditioning units. The units are installed in special rooms on top of the concrete vaults at points where the various workshop naves intersect the central connecting tunnel.

The air conditioning units are supplied air as required either from the outdoor air duct or as return air from the workshop. This is exhausted through suction openings in the concrete ceiling. The space between the concrete vault and the rock ceiling serves as a return air duct. This simple arrangement is possible since the rock is exceptionally dry and free from cracks. In addition to the obvious saving in cost, it also affords the advantage that the top surface of the vault is used for absorbing heat. Since the temperature of the rock is about 44.6 F, the temperature of the rock ceiling will be somewhat lower than that of the concrete vault, and a certain amount of heat transfer takes place from the return air also to the surrounding rock. Insulation of the cooled concrete vault is thus neither necessary nor suitable.

Air is supplied to workshops having a surplus of heat through ceiling portions of perforated aluminum sheets. This arrangement is designed to avoid draft at low supply temperatures. In workshops without surplus heat — storage rooms, assembly shops, etc. — circular air diffusers are used that are more suitable for distributing preheated air and rapidly mixing it with the room air.

In case of danger from injurious gases or poisonous gases and radioactive dust in wartime, the normal outdoor air intake is shut off and the reduced quantity of air still supplied passes through a filter system which removes the gases and other impurities. The cleaned air is then distributed by means of the regular air conditioning plant.

Thermostats, Hygrostat Provide Control

The air conditioning units are controlled partly by a thermostat, keeping the return air temperature constant, and partly by a hygrostat, which also is in the return air stream and maintains a maximum relative humidity of 50 percent. When the temperature tends to rise, the thermostat reduces the supply of hot water and opens the cold water supply.

Temperature control is completed by a minimum thermostat in the supply duct which prevents the temperature there from dropping below 53.6 F.

When there is a tendency toward excessive humidity, the hygrostat opens the bypass of the cooling battery and increases the supply of cold water.

The cooling apparatus serving the air conditioning units has to work with comparatively low temperatures due to the necessity of maintaining low humidity, and is, therefore, not suitable as a heat pump. Its condensers are entirely cooled by river water and the condenser heat is lost.

To obtain the best possible heat economy, the plant is so adjusted that the radiant cooling ceilings are utilized initially, and the cooling batteries are not used until the effect of the ceilings proves insufficient or if it is necessary to remove humidity.

Permit Removal of Vitiated Air

The need for removal of air for special purposes — such as grinding and polishing, cleaning with trichlorethylene, spray painting, transformer cooling, etc. — is so great that the air supplied to ordinary workshop areas is for the most part consumed to replace the amount of air removed from such places. The remainder is allowed to escape through the entrance tunnel. This tunnel also is used as an exhaust duct for air that has not become too strongly vitiated. In this way, exhaust gases from automobiles and trucks using the tunnel are removed without any special ventilating plant being necessary.

Realize Power Cost Saving

The cost of the entire installation was about the same as it would have been for a conventional plant, including a boiler plant. The total power consumption for compressors and auxiliary electric heating has cost only a little more than $4800 per year, the price of electric power being calculated at 0.97c per kwhr. The cost of heating the ventilation air by means of hot water at $2 per MBtu would have been around $6800.

The workshops were put into use in July 1953. The results achieved have come up to expectations.

The heat dissipation from machinery and lighting in some parts of the workshops reaches a value of 55 Btu per sq ft of floor area. This would have called for an air quantity equivalent to about 12 air changes per hour with an entering air temperature of 50 F had the air conditioning been the only means for heat elimination. There is little doubt that such values would have caused draft troubles.

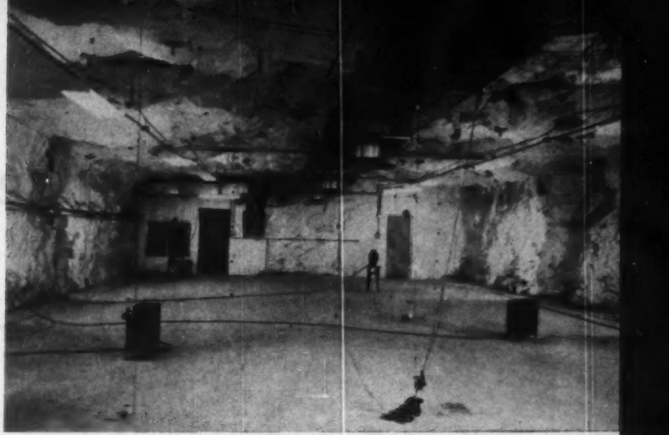
With the actual installation, only about half of the mentioned air quantity has been necessary, the remaining heat being removed by the heat pump system.

The temperature in the workshops has been maintained at between 64.4 and 68 F. In other underground workshops studied in connection with design and planning, the temperature was 69.8 F or higher, and in certain cases much higher. Such high room temperatures are due to the attempt to reduce or prevent drafts and are, no doubt, a contributary cause of the increased sense of fatigue noted in these workshops.

It is too early to determine whether this effect of abnormal fatigue has been eliminated by this workshop's cooling system. But certainly an improvement has been attained as compared with previously built plants. ╪

Underground Test Chamber Provides Heat Transfer Data

. . . for establishing design criteria



UNDERGROUND CHAMBER used for conducting experiments was heated through duct system and by space heaters. Temperatures were measured at 385 points

SINCE World War II much attention has been given to the use of natural or man made caves by military, industrial, and civil defense groups for storage of goods or for shelter of personnel. One of the problems encountered is that of maintaining the space at a selected design temperature that may differ from that of the surrounding rock.

When such an underground space is to be cooled or heated to other than its natural temperature, heat transfer between the space and the earth must be considered under the transient conditions which exist. Heretofore, adequate data on the heat flow has not been available.

An analysis of heat transfer design criteria in underground chambers has recently been completed by the National Bureau of Standards. The results provide a quantitative basis for predicting mathematically how much heating or cooling a particular chamber will require to maintain a constant temperature.

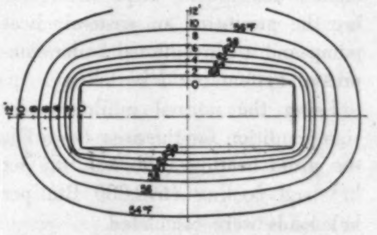
Subsequent experiments in an actual cave confirmed the range of accuracy of the mathematical solutions and supplied correction factors for representative chamber shapes.

The shapes of underground chambers approach those of hollow rectangular parallelepipeds. However, a mathematical solution for transient heat flow outward from a rectangular parallelepiped would yield expressions in three dimensions from which it would be troublesome to obtain numerical values. An infinite cylinder or a sphere may also be used to approximate the shape of a chamber, but the mathematical solutions obtained for these shapes are much more readily evaluated.

The radius of an equivalent cylinder or sphere can easily be computed from the surface area of the chamber for which it is an approximation. Some departure of results calculated for these simple shapes from those of an actual chamber must be expected as a result of end, edge, and corner effects.

Accordingly, experimental results were obtained in an actual cave to provide data for correction factors to make the mathematical solutions applicable to actual chambers with sufficient accuracy.

For the experimental work, a chamber, 100 × 35 × 10 ft high, was chosen. It was located a few hundred feet underground and remote from the surface in a horizontal direction. The thermal properties of the dense rock surrounding the chamber were determined at the bureau. Within the chamber, 385 thermocouples were installed at various locations in the space, on the rock surface, and at various distances in the rock to a depth of 12 ft. Heat was added to the air by electric strip heaters mounted in the air ducts. The heat input rate was measured with watthour meters connected to the heaters.



TEMPERATURE DISTRIBUTION in rocks to 12 ft depth around chamber plotted here, showing results after chamber temperature had been kept constant for 521 hr

Initially, the measured rock temperature was nearly uniform at 53.8 F. After a constant heat input of 8.4 Btu per hr per sq ft of projected area of rock surface had been applied to the chamber for 139 hours, the temperature of the air reached 75 F.

At this time, a thermostat began regulating the heat input to maintain the temperature at 75 F. Heat input was measured continuously for 110 days, until sufficient data was taken.

The results of this and two similar experiments showed that the heat input necessary to maintain a constant temperature was slightly greater than that indicated by the mathematical solutions for the cylinder or the sphere. Correction factors based on the dimensions of the chamber were therefore formulated so that the mathematical solutions could be applied in a practical manner to caves of various shapes and dimensions.

Numerical values of four mathematical functions needed for calculating the transient heat flow for the infinite cylinder and the sphere have been tabulated for a wide range of values of the independent variable. The independent variable contains time and size of chamber collectively. ≠

Maintenance, First Cost Analyses

. . . for new telephone exchange building

Air-to-air heat pump system meets zero F outdoor design temperature to provide year 'round cooling, heating. Installation saves equipment space, provides reasonable operating costs. Building requires close humidity control for telephone switchboard components, precise temperature control for occupants.

BY JOHN M. KEARNEY
Mechanical Engineer

and

HERBERT PETERS
Electrical Engineer

PACE Associates, Architects and Engineers

For year 'round heating and air conditioning in less severe climates the heat pump can often effect savings in installation, operation, maintenance, and building costs.

Such was the case with the installation of the heat pump system at the General Telephone Co. of Kentucky building at Ashland. The structure comprises a 22,000 line automatic dial exchange and also serves the long distance operations for the area.

Housing these functions together presented two major air conditioning problems. First, the space to be occupied by the automatic dial equipment (one-third of the total building area), while not requiring precise heating or cooling control, would require low humidities and, as far as possible, absolutely clean air. Also, the space to be occupied by the long distance operators — a continuous occupancy — would require precise and reliable air temperature control in both winter and summer.

Compare Cost Factors

The exchange building, as built, contains approximately 28,000 sq ft. The first and second floors are 16 ft floor to floor, and the basement is 12 ft floor to floor. Ventilation requirements are 25,600 cfm of air.

With these plan and ventilation factors determined, steps in weighing the merits of an air-to-air heat pump and a conventional boiler-compressor system could be taken.

Using the normal minimum design condition for the area (zero F), the gross heating (596,000 Btu per hr) and cooling (698,000 Btu per hr) loads were calculated.

A careful comparison of fuel costs using identical loads and electricity rates showed that yearly operation costs would favor neither system in direct fuel billing. A comparative study of the maintenance requirements of both systems revealed that, while a heat pump system would need about the same maintenance as the cooling cycle of a boiler-compressor system, the latter system would require the additional maintenance of the boiler. This indicated that there would be a nominal yearly saving by using a heat pump.

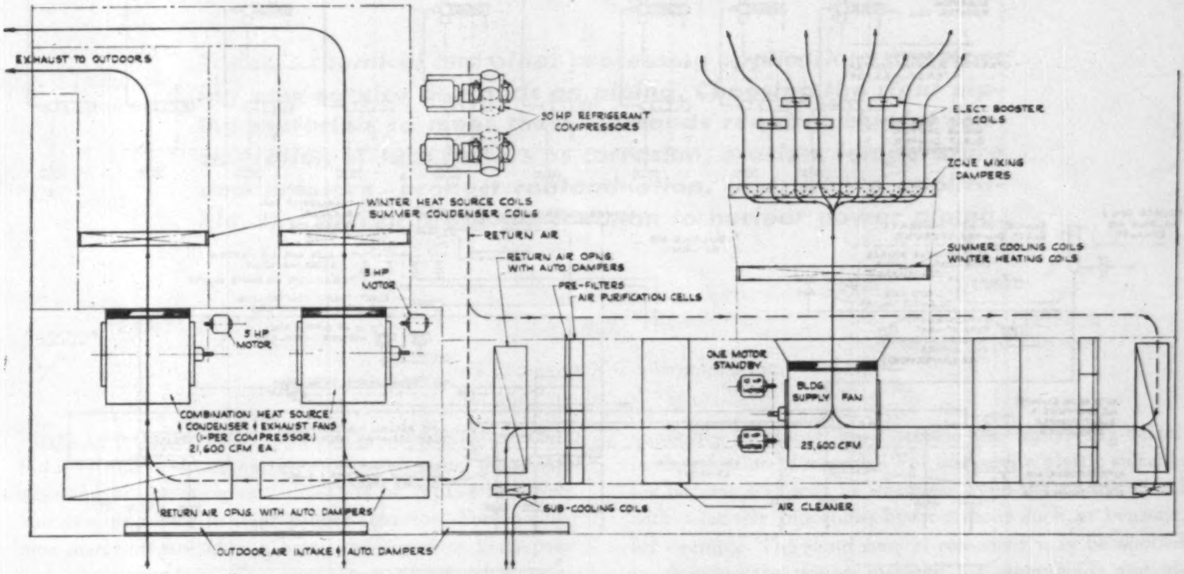
Another economy factor which became apparent early in the analysis was that the initial installation would cost less if refrigeration compressors could be used as both the cooling and heating source.

Choose 60 Ton System

Based upon those cost comparisons and the loads involved, it was decided that a 60 ton air-to-air heat pump system be installed.

To extract heat from the air at the

Favor Heat Pump Installation


EXHAUST TO OUTDOORS
30 HP REFRIGERANT COMPRESSORS
WINTER HEAT SOURCE COILS
SUMMER CONDENSER COILS
RETURN AIR
RETURN AIR OPNG. WITH AUTO. DAMPERS
PRE-FILTERS
AIR PURIFICATION CELLS
5 HP MOTOR
5 HP MOTOR
COMBINATION HEAT SOURCE & CONDENSER & EXHAUST FANS (1-PER COMPRESSOR) 21,600 CFM EA.
RETURN AIR OPNS. WITH AUTO. DAMPERS
OUTDOOR AIR INTAKE & AUTO. DAMPERS
SUB-COOLING COILS
AIR CLEANER
ELECT BOOSTER COILS
ZONE MIXING DAMPERS
SUMMER COOLING COILS
WINTER HEATING COILS
ONE MOTOR STANDBY
BLDG. SUPPLY FAN
25,600 CFM

NINE ZONES are supplied with heated or cooled air from central system. Five zones have electric booster heaters to supplement heating when outdoor temperature drops below 18 F. System includes provision for admitting 100 percent outdoor air during mild weather. Two 30 hp compressors serve year 'round system

zero F outdoor design temperature, it is necessary to operate the two 30 hp refrigeration compressors at a suction temperature of approximately −6 F. This condition limits the hot gas discharge temperature to 94 F.

The discharge gas is piped through two automatic four-way changeover valves to the direct expansion coils in the ventilating system. As the hot gas passes through the ventilating system coils, it is condensed and becomes a liquid. The liquid is piped to expansion valves at the winter heat source coils. Heat is extracted from these coils and, through the refrigerant suction piping, is returned to the compressors.

With the addition of three-stage electric booster heaters in five of the nine zones of the ventilating system, the entire building is heated.

When the outdoor temperature rises to 18 F, the heating system no longer requires heat from a source other than the heat pump. Since the average maximum temperature drops below 32 F on an average of only 13 days a year, the heat pump furnishes all of the heat required by the building almost continuously.

When cooling is required, the four-way changeover valves return the system to conventional operation. The coils in the ventilating system serve as evaporators and furnish cooled and dehumidified air. At the same time, the winter heat source coils act as condensers. Fans are utilized to move air through these coils, dissipating the heat from them to the outdoors. These units also serve as building exhaust fans.

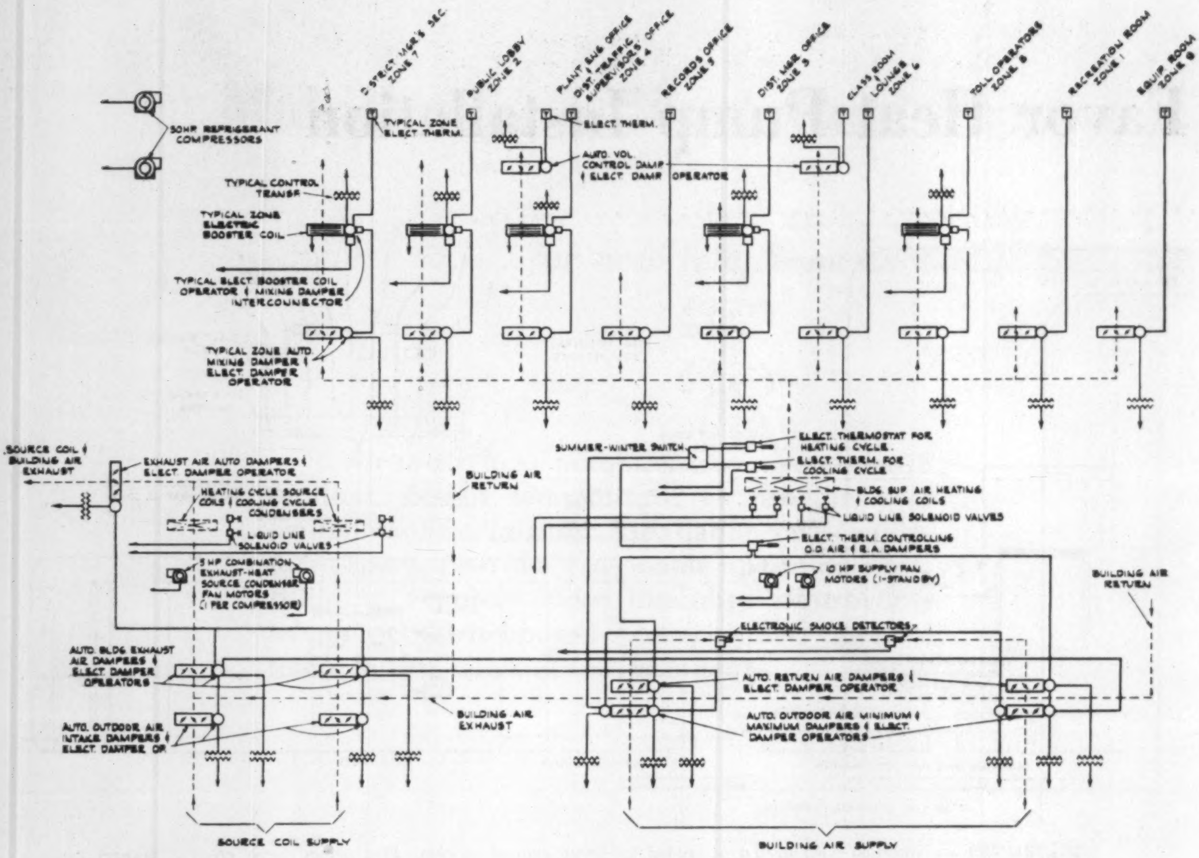
High limit humidity control necessitated the circuiting of the heating-cooling coils to limit the humidity to 45 percent at an indoor dry bulb design of 80 F. Humidities much beyond 45 percent are considered detrimental to efficient operation of telephone switchboard equipment.

Activated carbon odor control cells and electrostatic air cleaners are incorporated in the system to assist in maintaining efficient operating and working conditions. With these features, 87½ percent of the air is returned to the supply system during extreme outdoor temperatures.

9 Zones Comprise System

The control system consists of nine main zone thermostats, each with a summer-winter changeover switch. Two additional thermostats in each of two zones control the volume of air delivered to portions of these zones in order to correct air quantity balance upon season changeover.

On winter setting, the nine main zone thermostats position electrically driven zone mixing dampers to maintain temperatures. In five of the


DISTRICT MGR'S SEC. ZONE 7
PUBLIC LOBBY ZONE 2
PLANT ENG OFFICE & DIST. TRAFFIC SUPERVISORS' OFFICE ZONE 4
RECORDS OFFICE ZONE 5
DIST. MGR OFFICE ZONE 3
CLASS ROOM & LOUNGE ZONE 6
TOLL OPERATORS ZONE 8
RECREATION ROOM ZONE 1
EQUIP. ROOM ZONE 9
50HP REFRIGERANT COMPRESSORS
TYPICAL ZONE ELECT THERM.
ELECT. THERM.
AUTO. VOL. CONTROL DAMP & ELECT DAMP OPERATOR
TYPICAL CONTROL TRANSF
TYPICAL ZONE ELECTRIC BOOSTER COIL
TYPICAL ELECT BOOSTER COIL OPERATOR & MIXING DAMPER INTERCONNECTOR
TYPICAL ZONE AUTO. MIXING DAMPER & ELECT. DAMPER OPERATOR
SOURCE COIL & BUILDING AIR EXHAUST
EXHAUST AIR AUTO DAMPERS & ELECT. DAMPER OPERATOR
HEATING CYCLE SOURCE COILS & COOLING CYCLE CONDENSERS
LIQUID LINE SOLENOID VALVES
5 HP COMBINATION EXHAUST-HEAT SOURCE CONDENSER FAN MOTORS (1 PER COMPRESSOR)
BUILDING AIR RETURN
AUTO. BLDG EXHAUST AIR DAMPERS & ELECT. DAMPER OPERATORS
AUTO. OUTDOOR AIR INTAKE DAMPERS & ELECT. DAMPER OP.
BUILDING AIR EXHAUST
SOURCE COIL SUPPLY
SUMMER-WINTER SWITCH
ELECT. THERMOSTAT FOR HEATING CYCLE.
ELECT. THERM. FOR COOLING CYCLE
BLDG. SUP. AIR HEATING & COOLING COILS
LIQUID LINE SOLENOID VALVES
ELECT. THERM. CONTROLLING O.D. AIR & R.A. DAMPERS
10 HP SUPPLY FAN MOTORS (1-STANDBY)
BUILDING AIR RETURN
ELECTRONIC SMOKE DETECTORS
AUTO. RETURN AIR DAMPERS & ELECT. DAMPER OPERATOR
AUTO. OUTDOOR AIR MINIMUM & MAXIMUM DAMPERS & ELECT. DAMPER OPERATORS
BUILDING AIR SUPPLY

CONTROL SYSTEM consists of nine main zone thermostats, each with summer-winter changeover. These position electrically driven zone mixing dampers to maintain temperatures, and, during winter, actuate electric booster heaters which operate in sequence with dampers

zones, three-stage electric booster heaters, operated in sequence with the zone mixing dampers, provide additional heat required during extreme weather.

During summer operation the main zone thermostats control the mixing dampers only. The volume control in two of the zones is inoperative.

An electric thermostat in the supply fan discharge (in the entering air side of the heating or cooling coils) positions the electrically operated outdoor air-return air dampers in the building supply system and the outdoor air-exhaust air dampers in the combination exhaust-heat source-condenser fan system.

Two electric thermostats in the supply fan discharge on the leaving air side of the coils regulate the temperature of air supply to the mixing dampers. One thermostat governs cooling temperatures and the other heating temperatures. Through the closing of liquid line solenoid valves (thereby changing over the gas pressure operated four-way refrigerant valves) these two thermostats determine whether heated or cooled air is delivered to the building. These thermostats also determine—through the main electric panel—whether one or two refrigerant compressors are in operation.

On the winter source coil defrost cycle, the refrigerant system reverses normal flow and operates on summer cycle until coils are defrosted. This operation is actuated by a static pressure sensing instrument.

Electronic smoke detectors in the supply fan inlets, when actuated, shut down all systems.

Planning Pays Off

Planning estimates indicated an operating cost of approximately $1350 per complete heating cycle. Actual yearly heating costs after two winters' operation have been found to be actually a trifle lower. The use of 100 percent outdoor air for maintaining indoor comfort conditions further reduces operating costs when very little heating or cooling is needed.

It has been shown in this article that the operating costs of a heat pump and a conventional boiler-compressor system are about the same, but that the heat pump can provide savings in installation and maintenance costs. The heat pump can also offer additional savings in mechanical equipment space—in this case, 25 percent. This space savings becomes even more significant when interpreted in terms of dollars per square foot for construction.

The mechanical (heating, piping, and air conditioning) contractor for this installation was Conditioned Air, Inc. ⧧

Check Requirements, Design Factors When Choosing Piping Materials

Today's chemical and other processing applications are placing new service demands on piping. Choosing the right piping materials to meet these demands requires careful consideration of such factors as corrosion, erosion, temperature and pressure, product contamination, and, where applicable, the special problems common to nuclear power piping.

BY O. N. DUDKIN
Mechanical Engineer

and

F. F. PFEIFFER
Chief Mechanical Engineer

United Engineers & Constructors, Inc.

POSTWAR technological strides in the chemical processing industry and the resultant increase in chemical plant construction are creating new demands on piping materials and new problems in their proper selection. Fortunately, new materials are always being developed to keep pace with these demands. The application of empirical techniques in dealing with old material standbys has thus far solved the problem of containing particularly hard-to-hold fluids.

In the selection of piping materials, the engineer is confronted with such major considerations as corrosion, erosion, temperature and pressure, product contamination, fabrication techniques (support, bending, and spans), and nuclear power problems. The extent to which these factors influence selection requires further consideration.

Check Critical Corrosion Factors

1) *Corrosion.* Research on corrosion has been and always will be extensive. Many publications and text books are full of helpful data on the many facets and details of the subject. Therefore, only the major considerations will be discussed here.

Before accepting a statement that a certain alloy or plastic will be suitable for a particular fluid, the engineer must check these facts:

a) *Concentration.* There is a great difference in corrosion rates between concentrated and diluted solutions. For example, carbon steel pipe may be perfectly satisfactory for concentrated sulfuric acid (60 to 66 deg Baume), but lesser dilutions will require cast iron, high silicon iron, glass or glass lined, Series 300 stainless steel, monel, lead or lead lined pipe, or one of many plastics. The problem of concentration includes investigation of other compounds in the fluid which, although in small quantities or traces, may become the controlling factor in the selection of material. For instance, a plastic suitable for sulfuric acid may be worthless when the acid is mixed with relatively innocuous hydrocarbons such as benzene, for example. The same general reasoning may be applied in choosing the piping material for other acids and alkalies.

b) *Temperature.* Temperature usually has a great effect on corrosion rate. Most published corrosion tables include temperature effect data. The engineer must investigate the expected temperature range and choose his material accordingly. In some cases the fluid may have to be kept within the selected temperature limits by cooling, steam tracing, or other means to prevent entry into the corrosive range.

c) *Electrolytic corrosion.* Here, the well-known problem of the reduction of one of two dissimilar metals in contact when immersed in an electrolytic solution is further expanded by experience. It was once thought sufficient to prevent mutual contact of the dissimilar metals. However, it has been found that, under otherwise unpredictable circumstances, the mere passage of the fluid through a pipe line made up of dissimilar metals insulated or isolated from each other can still cause trouble. To cite an example, sulfuric acid in a system containing monel and lead lined steel piping can cause pitting and failure of the lead lining within a few weeks. Investigation beforehand can ferret out other unfortunate material combinations.

Corrosion + Erosion = Trouble

2) *Erosion.* Erosion in itself is easy to comprehend and cope with, but it becomes a more baffling and embarrassing problem when its effects are combined with corrosion. A fluid that has a relatively low corrosion rate

on, for instance, carbon steel can cause quick failure in pipe lines. This is particularly true at elbows and restrictions, since the continuous "washing" away of the corroded metal bares fresh material for further corrosion. This situation may then call for the selection of a harder material such as stainless steel which may be no better corrosionwise, but superior in erosion resistance.

Pressure and temperature permitting, a plastic, wood, or rubber lining may also be effective. Here, a softer substance has been found to be generally superior to a hard surface in resisting abrasion, particularly in slurry service.

Temperature, Pressure Related Conversely

3) *Temperature and pressure.* A more common problem is the selection of piping materials purely for temperature and pressure compatibility.

As flowing media temperatures increase, the ability of the conveying material to withstand higher temperatures must logically increase. From the lower to higher temperatures these materials extend from most plastics to chrome-moly steel alloys. Stainless steel alloys are better suited to higher temperature than plain carbon steel.

As temperature increases, the allowable stress on practically all materials decreases. Therefore, some overlapping in the selection of materials is inevitable. A low pressure-high temperature fluid or a high pressure-low temperature fluid may require the same alloy pipe in order to gain the necessary physical strength. Reference to the American Society for Testing Materials specifications, the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, and the American Standard Code for Pressure Piping is all but mandatory when working in above ambient temperatures.

Product Purity is Prime Requisite

4) *Product contamination.* This all-inclusive area encompasses the food, pharmaceutical, and chemical processing industries. Here, the main problem does not concern the life of the piping system itself, but rather the effect of corrosion on the product piped. Any piping rust found in milk, drugs, demineralized boiler makeup water, or near-the-end product chemicals can render the fluid unsalable or useless.

Stainless steels, aluminum, plastics, and glass, through their noncorrosiveness characteristics, have been found to be best suited for preserving product purity.

Consider Various Fabrication Techniques

5) *Fabrication techniques.* A first bridge to cross when using metal piping is to determine whether or not welding is permitted in the proposed area. If not, then the designer must plan on one of the following major fabrication techniques:

a) *Threaded pipe and fittings.* This technique may be undesirable for application at high temperatures and pressures and with many fluids which somehow manage to seep through the tightest joints.

b) *Rolled-on flanges for field fitting and fabrication.* This method is easier and more successful with light gage pipe (Schedules 5 and 10), but has been satisfactorily applied on standard gages as well.

c) *Prefabricated welded sections with flanged or union ends.* If welding in the erection area is permitted, the designer must be aware of other pitfalls. In the welding of most stainless steels, a phenomenon called carbide precipitation occurs. In short, if no treatment is made, the metal near the weld loses some of its corrosion resistance.

One solution to this problem is to heat treat the welded area to regain the original properties. This procedure at best is costly and sometimes ineffectual because of human error or slackness.

An alternate solution, if using Series 300 stainless steel, is to use an alloy with a very low carbon content (0.03) or Type 321 or 347 alloy. Either of these latter types tends to keep the carbon in the alloy suspension. These alternate materials demand premium prices, but usually the installed cost is favorable.

Similar difficulties can be encountered in the welding of carbon steel pipe. Most leaks appear at or near the joint. In caustic service, for example, stress relieving the welds of carbon steel pipe is highly desirable. In this same service, spot welding of hangers or clips, etc., to the piping should be prohibited unless stress relieved, to insure against local corrosion.

Fabrication of various nonmetallic piping is a science in itself. Each manufacturer has worked out the necessary procedures and these should be followed explicitly. The joints can be screwed or solvent or heat welded in polyvinyl chloride piping, clamped in polyethylene tubing, or flanged in rubber or glass lined pipe. The designer, in choosing his material on the basis of fabrication, should know whether he wants a purely field fabricated job or one of the made-to-order shop fabricated type. The latter may be necessary if piping lined with plastic, rubber, lead, or glass is to be used.

Nuclear Energy Presents Special Problems

6) *Nuclear power problems.* The field of nuclear energy presents some new concepts which must be considered. Among these are nuclear radiation damage, gamma ray effect, and thermal shock.

Regarding nuclear radiation damage, the singular and combined effects of atom displacement, neutron absorption, and ionization produce harmful results on the piping material's mechanical and physical properties.

Certain materials tend to attenuate gamma rays, producing heat, thereby building up thermal gradients and stresses.

Common to certain nuclear energy systems is almost instantaneous transfer of high temperatures. In fact, severe thermal shocks to piping can develop in seconds.

The answers to these critical problems can only come from careful consideration of various situations. ‡

Sam Lewis' Page

Ways to Cut Installation Costs

. . . of heating, air conditioning equipment

UNUSUAL INTEREST was in evidence at a recent, well-attended meeting at which a consulting engineer, a contractor, and a manufacturer were invited to discuss ways and means of reducing the investment costs of heating and air conditioning systems.

The engineer stated that three factors were influential in reducing the costs for any given job. These are:

1) Proper design of the job, including all details which provide specific information on each part

2) Complete specifications and drawings (All mechanical details should be included, as errors and omissions are costly)

3) Close cooperation between all trades during the installation.

I fully agree with the engineer with reference to clear-cut specifications, especially as to opportunities by a competitive bidder for suggesting substitute materials that might bring about economies to the owner. I also concur with the thought that a large number of bidders is wasteful. It is better to ask for bids from a smaller number who will be qualified to do the job.

The engineer voiced the need for more space allowance by architects for mechanical equipment, but made no serious complaint about the quality of materials and workmanship.

He also cited the increasing cost of mechanical equipment in present day construction. This increased ratio of heating and air conditioning costs to the total cost of construction opens many avenues to the study of ways where costs may be reduced.

The contractor presented his points as "Thoughts While Estimating." He stressed that economies can be effected in pipe and valve installations. He cited as an example a case where $232 was saved by using smaller valves in a pressure reducing station. To do this, the size of the flange increaser was reduced to the same diameter as that of the reducing valve.

Another point mentioned by the contractor concerned the elimination of valves in steam branches to blast coils. He cited a case where one 4 in. valve was to be used at the takeoff, and 2 in. branches to the coils were to include 2 in. valves. He suggested that an appreciable saving could be made by eliminating the 2 in. valves.

I think the contractor could be right in allowing the steam to expand after leaving the reducing valve. He could suffer for having failed to provide valves on supply and return connections to each section of a blast coil or to each radiator.

The need for duplex condensate pumps was also questioned by the contractor. He stated that a condensate pump could be repaired in 3 or 4 hr, during which time the condensate could be wasted without serious loss.

I do not agree, as a general recommendation, that no standby or duplex pumps should be provided on large industrial projects.

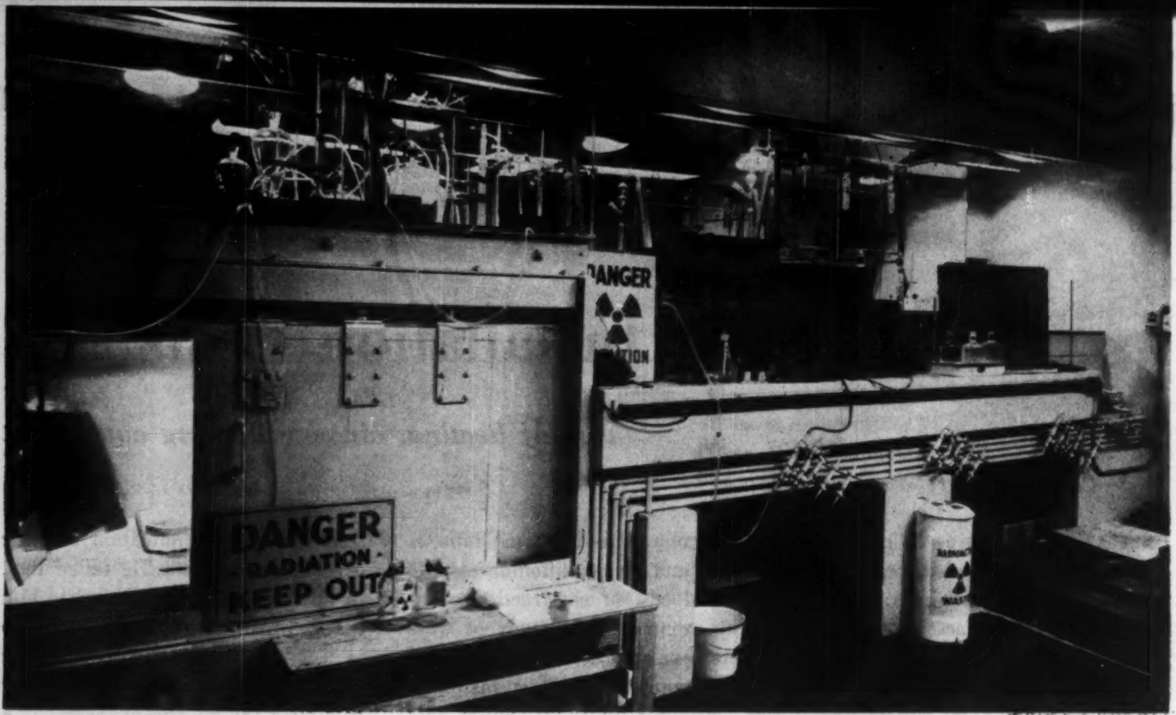
Among other considerations for cost saving presented by the contractor was the elimination of some of the thermometers. He stated that, in many cases, it has seemed to him that too many are specified. The job is usually balanced by means of a pyrometer anyway, he said. Another case cited the hookup of several unit heaters in an industrial plant to one thermostat whose setting was reduced at night, instead of controlling each unit individually to reduce the temperature when the plant is unoccupied.

The manufacturer mentioned the possibility of an increase in supply and exhaust fan speed without objectionable noise. Recent improvements in blade shape and in the inlet and outlet details of centrifugal fans have aided in achieving this result.

He encouraged the increase of air velocities through heating coils, and sees no reason for the 500 fpm face velocity that is thought to be an upper limit. Velocities of 600, 700, and even 800 fpm may provide better control and heat transfer.

Unfortunately, some very important cost saving factors were not discussed or were quickly passed over. The economies of automatic control of temperature and relative humidity were not stressed by any of the speakers. The sheet metal duct men apparently were not admonished about possible savings gained by employing smaller tubes at higher velocities. Few remarks were made about the rapidly accelerating necessity of cooling towers and evaporative condensers, or of the savings possible, in some cases, where steam must be generated the year 'round, of employing refrigeration by absorption. ‡

SAMUEL R. LEWIS, *consulting mechanical engineer and a member of HPAC's board of consulting and contributing editors, comments informally each month on practical heating, piping, and air conditioning problems.*



1 FUME HOODS should face laboratory air supply, exhaust contaminated products continuously

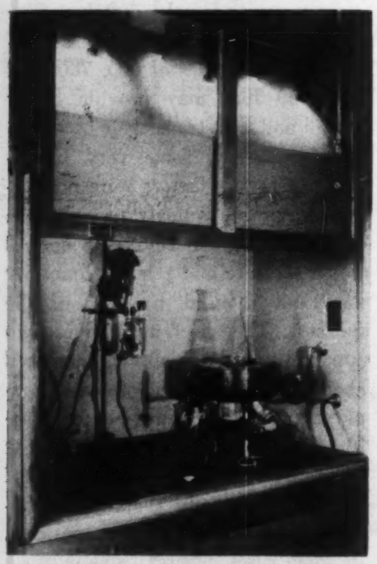
What to consider when:

Designing Fume Hoods for

BY JOHN M. RUDDY
Chief Engineer
Architectural Planning Div.
Brookhaven National Laboratory

Radioactive fume removal requires new hood design criteria because toxicity cannot be readily detected. Room containing hood should have uniform air supply and distribution, and minimum interference from equipment, doors, personnel, etc. Design requirements for hoods include:

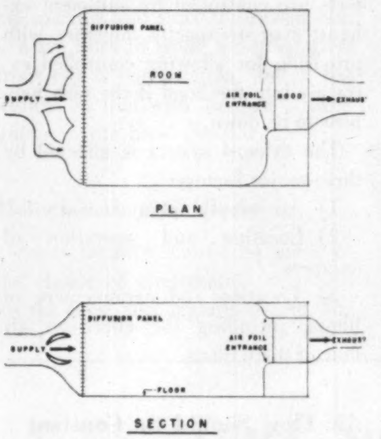
a) 100 fpm average entrance velocity
b) Positive exhaust
c) Constant air flow.



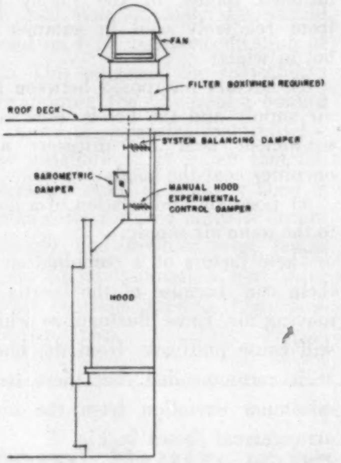
2 LIGHTING FIXTURES should be outside of hood and uncovered because of experimental nature of operation

DURING the past 15 years the ever increasing use of radioactive materials in laboratory fume hoods has brought about entirely new hood design criteria because of the danger inherent in materials that cannot be sensed or detected without instruments and which may be toxic in very small quantities, and in addition have cumulative effects. Basically, hoods for handling radioactive materials must be built to operate under all conditions without "puffbacks," i.e., flow from the hood into the room. In addition, velocities through the opening — working space — should preferably be not more than an average of 100 fpm because any appreciable increase above this velocity causes intolerably rapid air movement for much of the delicate experimental work.

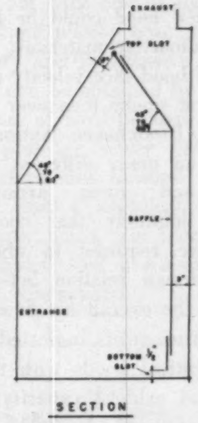
When it became apparent that the conventional fume hood was a per-


DIFFUSION PANEL
ROOM
SUPPLY
AIR FOIL ENTRANCE
HOOD
EXHAUST
PLAN
DIFFUSION PANEL
SUPPLY
AIR FOIL ENTRANCE
EXHAUST
FLOOR
SECTION

3 **IDEAL ROOM-HOOD arrangement** includes control tie-ins between air supply and exhaust to insure constant air flow


FAN
FILTER BOX(WHEN REQUIRED)
ROOF DECK
SYSTEM BALANCING DAMPER
BAROMETRIC DAMPER
MANUAL HOOD EXPERIMENTAL CONTROL DAMPER
HOOD

4 **SYSTEM STATIC LOSSES** should be decreased by means of damper so hood face velocity does not become dangerously low


EXHAUST
TOP SLOT
BAFFLE
ENTRANCE
BOTTOM SLOT
1/2"
SECTION

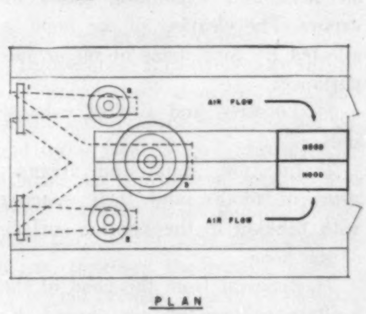
5 **BALANCED RELATIONSHIP** between exhaust slots and baffle arrangement insures removal of both light and heavy vapors

Medium Level Radioactive Conditions

sonnel hazard when working with radioactive materials, it was realized that much of the reason for its ineffectiveness lay in a lack of emphasis on the concept that the laboratory room in which a hood was located was essentially a large and complicated part of the overall air handling system. The room is, in fact, an enormous enlargement of the duct system, from intake to exhaust, containing besides the hoods other stumbling blocks to air control, such as furnishings and equipment, air diffusers, personnel, doors and windows, all of which affect the movement of room air into and through any hood.

What Is Ideal Room Setup?

A description of an ideal room-hood arrangement might be useful to help weigh the effects of the wide departures from the ideal that must obviously be made in practice. This ideal room would be rectangular and have no doors, windows, people, nor equipment. The air supply would enter perfectly diffused and at constant temperature and humidity completely over one of the small room ends and would then be exhausted through a hood at the center of the opposite end.


AIR FLOW
HOOD
HOOD
AIR FLOW
PLAN
DOOR
FLOOR
HOOD
SECTION

6 **CEILING DIFFUSERS** provide one means of introducing air into room uniformly

The hood end of the room would have flared walls from the hood entrance — face — to the side wall, ceiling, and floor to maintain laminar air flow. The interior surfaces of the hood — which would be empty — would be an extension of these flared surfaces up to the exhaust duct. The exhaust system would be perfectly balanced with the air supply system so that the air flow through the room and hood would be constant.

A great deal of effort has been made to date to build a really satisfactory hood, mostly at or for the various atomic energy research laboratories throughout the country; initially at Oak Ridge National Laboratory, and later at Los Alamos Scientific Laboratory, Argonne National Laboratory, and Knolls Atomic Power Laboratory. At Brookhaven National Laboratory use was made of data contained in the literature, together with experience, to formulate and more clearly define the various aspects of the problem in order to develop an experimental hood study which would produce data from which an effectively designed and constructed hood could be built for using radioactive materials.

Actual hood face velocity measurements and smoke tests over the past years at Brookhaven National Laboratory on many different types of hoods and room arrangements showed definitely that coordinated tests were required to obtain the proper design relation between the parts of the overall air flow system. Test measurements indicated that almost identical hoods with the same theoretical exhaust capacity and in similar rooms had widely varying face velocities. This was true between each other on a general average and at different locations on each hood entrance. Most hoods had some puffback difficulties. Two of the installations that were reasonably satisfactory were laid out — for reasons other than air flow — in such a way that the hoods occupied most of one end of the room and faced an air supply that was well diffused at the ceiling or from the far end. This is shown in Fig. 1. This information that every hood in a corner or near a door or window had eddy-current troubles lead to a decision to confirm these facts in a controlled test setup.

Provide 100 Fpm Velocity

The problem of deriving satisfactory design criteria which would prevent puffbacks and also provide an average velocity through the hood of about 100 fpm was found to comprise four parts: (1) supply air system, (2) hood entrance, (3) hood, and (4) exhaust system. The study, including numerous tests of a mockup hood, brought into focus the relationship of the four parts in the series air flow pattern on the whole system and revealed other information as follows:

The supply air system is affected by four major factors:

1) Method of introducing air into the room — location, height, types of diffusers, and control required to insure a constant flow

2) Change in air flow pattern occasioned by the change, in air conditioned rooms, of the supply air from relatively cold in summer to hot in winter

3) Factors interposed between the air supply and the hoods, especially equipment near air diffusers and openings near the hoods

4) Location and relation of a hood to the room air supply.

These factors or a combination of them can, because of the inertia of moving air, cause fluctuations which will cause puffbacks from the hood. It is recommended that there be a minimum deviation from the ideal arrangement shown in Fig. 3.

The hood (face) entrance affects the air flow into the hood in two ways: formation of eddy currents in the hood near its face caused by air flowing around corners, and extremely rapid rise in face velocity as the sash approaches the closed position. The first effect is one of the main causes of puffbacks. With the sash nearly closed, the high velocity near the floor of the hood causes undesirable cooling, powder blowing, and evaporation. Air foil entrance and barometric damper face velocity control are recommended.

Positive Exhaust Required

The hood requires positive exhaust of not only the supply air but also all heat and expanding gases or vapors. The clearing of the hood is affected by four items of major importance:

1) Location and size of exhaust slots

2) Location, slope and arrangement of baffles and their spacing with relation to the interior surface of the hood

3) Removal from the hood of the builtup volume of air caused by large heating loads which can cause a thermal head affect and puffbacks

4) Evaluation from the hood of appreciable volumes of gases occasioned by work.

A carefully balanced relationship between exhaust slots and baffle arrangement is essential to insure removal of both light and heavy vapors, and to establish a smooth air flow pattern within the hood. The thermal head and gas production effects are controlled by sufficient exhaust system capacity, together with provision for allowing controlled extra air into the hood if the sash happens to be down.

The exhaust system is affected by three major factors:

1) Air supply tie-in control

2) Location and operation of dampers

3) Location and arrangement of filters, including the effect on air flow of dirty filters.

Air Flow Should Be Constant

Air flow through any room with hoods should preferably be constant and include control tie-ins between exhaust and supply to insure this. Consideration should be given to an allowance of approximately one-fourth the static pressure difference between the outdoor air intake and hood exhaust stack to account for the wind effect at different parts of a building. A bypass is needed to allow constant flow through the room when the hood sash is down, and the barometric damper recommended for controlling face velocity also takes care of this.

Filters can be installed at the farthest end of the exhaust system before the fan, as experience indicates that very little dust contamination occurs in the ducts. In addition, arrangements should be made to decrease system static losses by means of a damper — as the filter gets dirty — in order that the hood face velocity does not become too low for safety. This is shown in Fig. 4.

Put Lighting Fixtures Outside

In addition, lighting fixtures should be completely outside of the hood and completely uncovered both from the experimental operation and building maintenance points of view. Light should enter the hood through tempered safety glass.

The illumination level in most of the early commercial types of hoods was inadequate for the present type of work, which requires at least 50 ft-candles maintained at the working surface. Since hoods should be provided with an allowance for a rear top exhaust and since the raised sash is a top limit in front, a sloping glass front top is one solution, and it has worked in well with air flow streamlining in the hood interior.

Materials Depend On Acids

Some mention should be made of the choice of construction materials for the hood and exhaust system. Experience indicates practically no cases of duct contamination and but very few of gross hood contamination. Selection of materials should depend on type and concentration of acids. This suggested the advisability of examining the philosophy behind the choice of expensive materials for these installations. It is felt that the "calculated risk" of losing a hood is economically justified since it occurs so rarely and because most hoods subject to contamination now have interior coatings applied, regardless of construction.

Substantial neatly finished hoods of cement-asbestos board on a steel frame, as shown in Fig. 4, have been successful when carefully painted inside and out with one of the chemical resistant plastic base coatings. Satisfactory and inexpensive exhaust ductwork can be obtained by permitting the use of hard painted cement-asbestos pipe or heavy galvanized iron or aluminum finished with at least four coats of chemical resistant plastic type paint. In inaccessible places, stainless steel or a similar material is recommended. ≠

Duct System Built into Arches

. . . to air condition new church

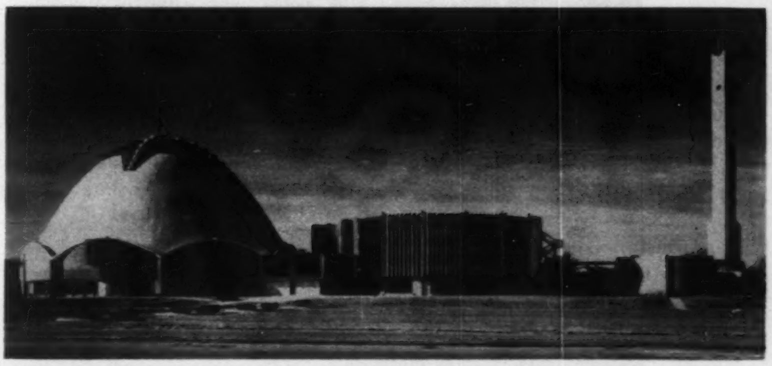
BECAUSE of the variety of activities planned for the unique new Oklahoma City First Christian "Church of Tomorrow," it was necessary to install an air conditioning system capable of operating under widely variable cooling load conditions, according to Trane Co.

The church consists of three buildings: an 80 ft high domelike sanctuary structure, 142 ft in diameter at ground level; a four-story circular educational building; and a music and fine arts building.

The unusual architectural design also created a problem in the selection and installation of the cooling system. Early in the planning stages a decision was made not to use exposed ducts for air distribution in the 2000 seat sanctuary.

This was solved by building the ducts into eight arches surrounding the sanctuary dome, completely hiding the duct system except for occasional diffuser outlets at the top.

A 150 ton capacity centrifugal refrigeration unit is the principal piece of equipment used in the air conditioning system for the three buildings. It supplies chilled water to large capacity air handling units, which handle the requirements of larger zones, plus fan-coil room air conditioners used in smaller areas.



"CHURCH OF TOMORROW" in Oklahoma City has widely variable cooling load resulting from intermittent use of three buildings. Water chiller capacity of 150 tons may be varied from 10 to 100 percent depending upon load

Temperature is controlled by three-way pneumatic valves at each air handling unit which modulate hot or cold water into the coils. No attempt is made to control the relative humidity because of the comparatively short duration of time each zone is in use. However, the relative humidity is held between 50 and 60 percent by maintaining the chilled water at a temperature of 42 to 43 F.

The sanctuary building, shaped like a "beehive," is constructed of thin shelled precast concrete. It is crowned by a stainless steel cap which protects the top from moisture seepage. Clear glass bubbles are set in the cap to admit light.

Directly behind the sanctuary is the four-story circular educational building. It houses 50 class and assembly rooms, plus a dining room on the ground floor.

Protection from the sun is provided by vertical louvers completely around the building.

The air conditioning system meets the varying load requirements dictated by the intermittent use of the several buildings by automatically adjusting from 100 percent down to 10 percent capacity.

R. Duane Conner, of Conner and Pojenzny, was the architect. R. S. Mackenzie designed the air conditioning system. The installing contractor was the Wattie Wolfe Co. ≠

Huge HTHW System Supplies

. . . at New York International Airport. For the first time, high temperature hot water is used in an air conditioning application. Nine absorption refrigeration machines are regenerated by this source. System supplies cooled air to vast expanse of buildings, which are connected to central plant by piping network. HTHW naturally serves as heating source, too. Other details of this installation are described in the February issue.

BY WILLIAM T. O'REILLY
Seelye Stevenson Value & Knecht
Consulting Engineers

NEW YORK CITY International Airport's refrigeration system consists of nine absorption machines regenerated by the use of high temperature hot water. The machines chill water from an entering temperature of 55 F to a leaving temperature of 45 F at which the distribution pumps circulate it to the various buildings. Cooling tower water is used for heat rejection.

The machines are equipped with automatic valves in the hot water, chilled water, and condenser water supply lines.

Flow meters show the approximate flow of the chilled water and cooling tower water to each machine. This assists in balancing the load. If the flow to any one machine is too low, the *open* button at the motorized valve control is pushed. When the flow meter indicates that the required flow has been reached, the *stop* button is pressed. The valve will stop in this position and maintain constant flow.

The high temperature hot water is automatically regulated to maintain a constant chilled water outlet temperature. The piping system is so connected that the valve closes when the machine is taken off the line.

A bypass bleed valve around each automatic valve keeps the units warm when not operating. These valves will be kept closed during prolonged periods of shutdown and re-opened before the others after such periods.

The cooling towers are of all redwood construction with concrete basins and are located on grade. Two sets of towers of three cells each are installed with six cooling tower pumps, or one pump per cell.

As the absorption machines are critical in relation to the temperature of the water off the towers, a bypass temperature regulating system has been provided. This functions as follows:

The optimum temperature of condenser water to the absorption machine is 85 F. Whenever the supply temperature to the condenser is less than 85 F, the bypass valve opens and bypasses some of the hot water from the condenser into the suction side of the cooling tower pump.

As it is impractical to size the bypass for the full capacity of the tower because of the large size of the regulating valve, a smaller size was selected. With this smaller size, a point can be reached where the valve is fully bypassed, but the temperature continues to drop. At this point the thermostat controlling the valve signals the annunciator panel, sounds an alarm, and lights a light. This indicates too much capacity on the tower. The remedy is to shut down one or more cells. On a rising temperature, the opposite happens, signaling insufficient tower capacity, the remedy being to start an additional one or more cells.

Water treatment for the towers is continuous feed type with the tank and feeder in the boiler plant. The chemical is mixed in the tank and fed into the cooling tower pump suction by a metering pump with an adjustable rate of feed from 30 cc to 5 gph.

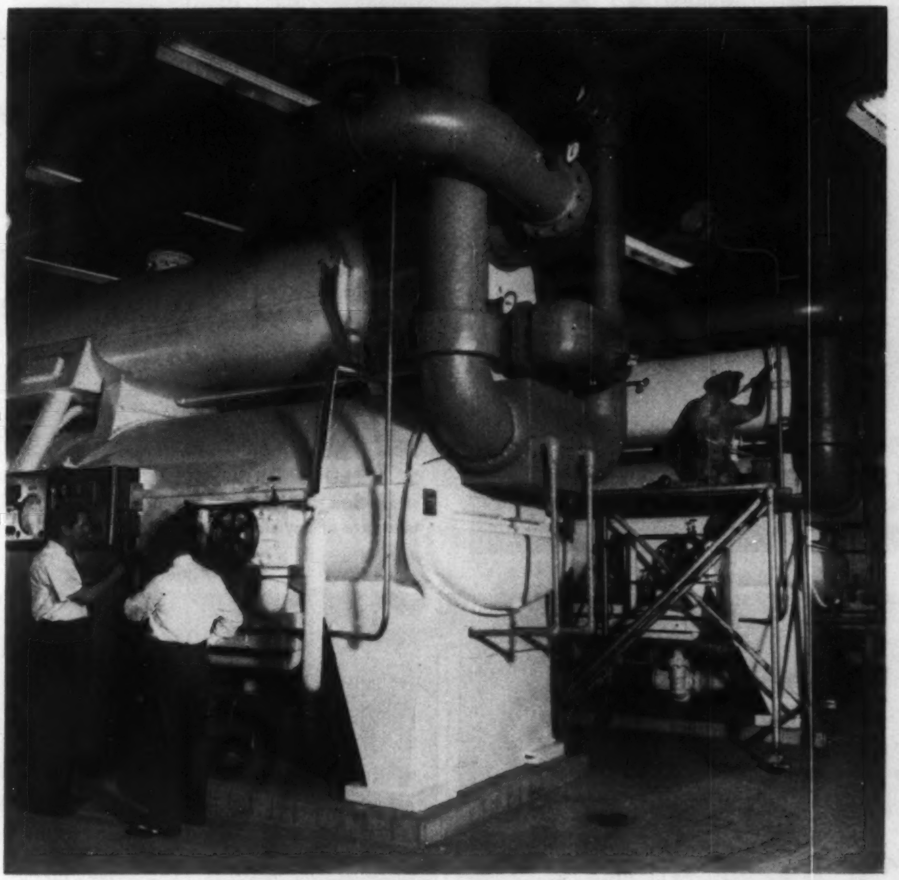
Distribute Hot or Chilled Water

The hot water distribution system comprises five pumps discharging to a manifold to which all zones are connected. A return manifold from all zones is connected to the return header at the expansion drum. Four pumps handle the normal peak load, with the fifth pump as standby. As the load falls off, pumps can be taken off the line.

Internal water treatment is provided for the chilled water system by a metering type of feed pump. A water treatment laboratory prescribes the type of water treatment chemical to be used at periodic intervals to maintain optimum water conditions.

The electrical system consists of a double ended substation, each ending with separate feeders. In the event of failure of one feeder or one transformer, the remaining transformer can handle approximately 66

Unique Cooling-Heating Operation



NINE 700 TON UNITS comprise central refrigeration plant. System chills entering water from 55 to 45 F, circulates it to various buildings

percent of the load. The connected load would have to be reduced by shutting down one-third the pumps and refrigeration machines. As the pump motors were selected at the maximum horsepower requirement, the demand horsepower may be less, which may permit almost 80 percent of the plant load to operate without overloading. Operating experience will determine the proper operating loads.

In general, the control for the motors is from the motor control centers with the automatic interlocks. Running time meters are provided for all large units to keep records of running times and to schedule maintenance.

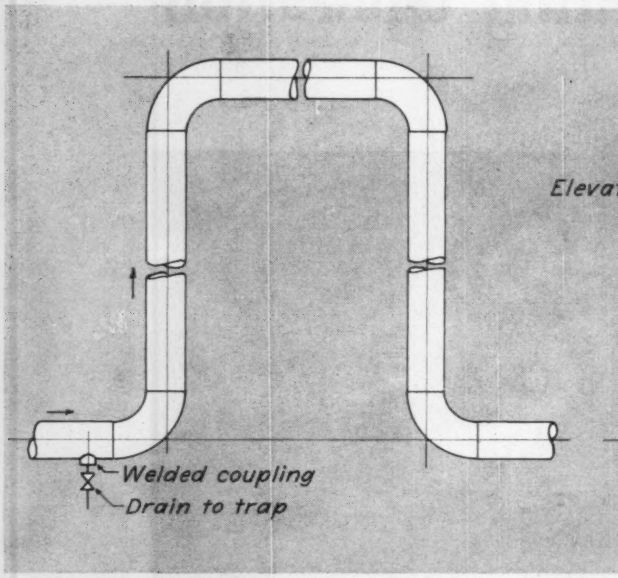
How System Serves Tenants

The hot and chilled water is circulated to each unit terminal. High temperature hot water is fed through a water-to-water heat exchanger in which secondary low temperature water is heated for the building heating system.

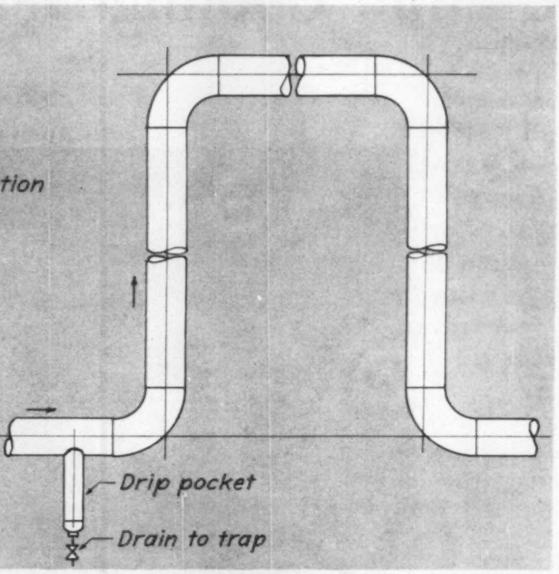
Chilled water is fed directly to the cooling coils in the air handling units. Booster pumps are provided by the tenants in the unit terminals, with sufficient head to handle the loss in the chilled water piping within their buildings.

A Btu meter in the utility room of each unit terminal measures and records the temperature and flow of the hot and chilled water. The readings are telemetered to the boiler plant over leased telephone wires, providing the operator with instantaneous knowledge of the distribution of loads. ‡

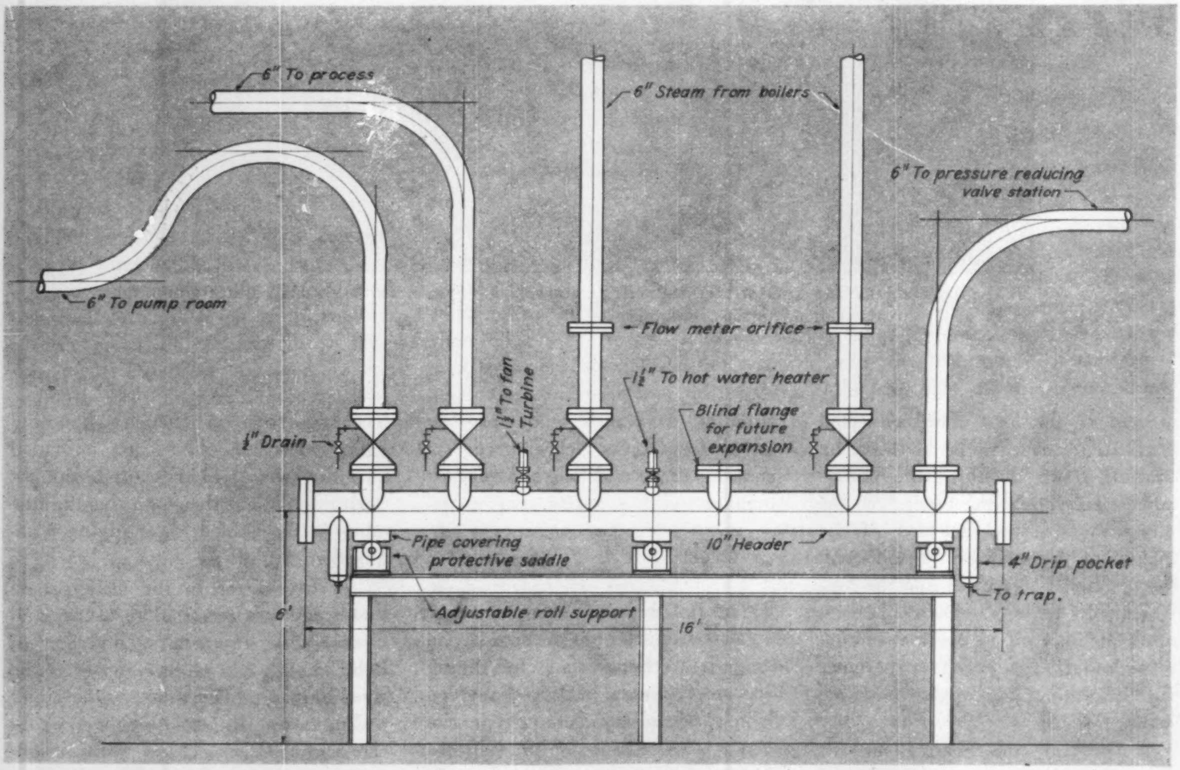
Don't Neglect the Lowly Drip Pocket:


Elevation
Welded coupling
Drain to trap

1 WITHOUT DRIP POCKET, low pressure steam line with 1¼ in. coupling will suffice, if horizontal run is short and if there is little condensate to be handled


Drip pocket
Drain to trap

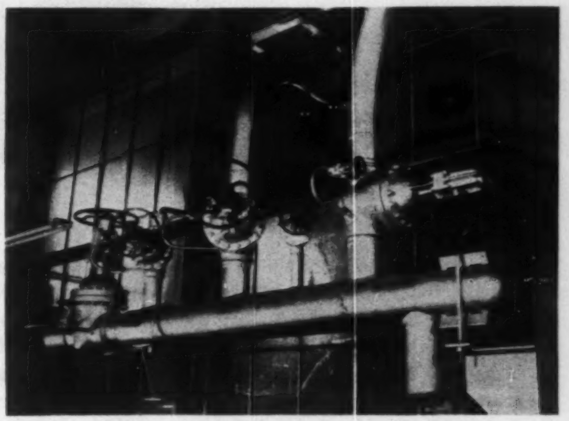
2 WELDED DRIP POCKET catches condensate quickly if steam flow is high or even moderate. Also, pocket would likely take care of any slug of water


6" To process
6" Steam from boilers
6" To pressure reducing valve station
6" To pump room
Flow meter orifice
1½" To fan Turbine
1½" To hot water heater
Blind flange for future expansion
½" Drain
Pipe covering protective saddle
10" Header
4" Drip pocket
To trap.
Adjustable roll support
6'
16'

3 TWO 4 IN. WELDED DRIP POCKETS on this 10 in. industrial steam header insure more complete separation of any condensate than would small welded couplings or pads

A Valuable Piping Accessory

. . . for condensate removal in steam piping systems.



4 DRIP POCKET on this 400 psig steam service header with moderate superheat could be important means to get rid of excess condensate should superheat ever be lost

BY G. W. HAUCK
Manager, Engineering Sales
Crane Co.

THE LOWLY DRIP POCKET is all too often neglected. When it is applied judiciously, it is a valuable piping accessory.

Whenever steam piping is being designed, providing means for the removal of condensate is a recurring problem and should never be overlooked. As piping increases in size, the need for adequate drainage of the condensate at strategic points increases in importance. For the larger sizes of piping conveying steam at or near the saturation point, drip pockets of adequate size qualify as useful and worthwhile piping additions.

A typical arrangement — Fig. 1 — shows the elevation of an 8 in. low pressure steam line with an 1¼ in. coupling represents a minimum approach and will suffice if the length of piping ahead of the vertical riser is short, and if no appreciable amount of condensate must be handled at this point of drainage.

An alternate construction, using a welded drip pocket, as shown in Fig. 2, is a preferable arrangement. If the steam flow is at high or even moderate velocity, the drip pocket will catch condensate more readily than the small coupling. Should a slug of water occur, the drip pocket is more likely to take care of it.

The steam header for 150 psig, saturated steam service, shown in Fig. 3, is typical of the situation encountered in industrial plants. This 10 in. header is equipped with two 4 in. welded drip pockets. If small welded couplings or pads had been used instead of the drip pockets, the small connections would, of course, permit the removal of some condensate. However, high velocity flow could render the small drain connections ineffective. It is the author's firm conviction that drip pockets insure much more complete separation of any condensate and, in addition, provide insurance against heavier slugs of water should these occur.

A header for 400 psig steam service with a moderate amount of superheat is shown in Fig. 4. The designer has provided a drip pocket (at right) in order to insure adequate drainage. Should the superheat ever be lost, the drip pocket could loom up very importantly as a means to get rid of the excess condensate.

The pocket should not be too small, as in the case of the small drainage connection on larger lines. Drip pockets are recommended confidently as extremely valuable and the better form of piping accessory. ⌿

The author is a member of Heating, Piping & Air Conditioning's board of consulting and contributing editors and has prepared numerous articles for publication in its pages.

Another article on piping hookups will be published in the future. Previous articles were in the September through December 1957 and January and February 1958 issues.

Two-Zone Steam and Hot Water

BY EDWARD J. FLAHIE
Hospital Engineer
St. Charles Hospital, Toledo

IN PLANNING for the construction of the St. Charles Hospital, Toledo, studies were made to select a type of system which would best provide comfort to patients—the paramount consideration—and at the same time meet the process needs of the institution.

The answer was found in the installation of two systems—one hot water and the other steam—both supplied from one boiler. The forced circulation hot water system heats all patient rooms. All other areas are served by the steam system. In operation, the steam is converted by means of shell-and-tube convertors.

The steam plant consists of three two-drum, water tube type, No. 6 oil fired boilers. One is adequate for the present demand, so their use is rotated. The design pressure is 125 psig, and the capacity is 11,500 lb per hr of steam at 200 percent rating.

Close Temperature Control

Uniform temperatures are maintained in patient rooms by means of outdoor thermostats designed to reflect the load imposed by outdoor temperature, wind velocity and direction, solar radiation, and other conditions.

The hot water system is divided into two zones with reverse return circuits. The returns are connected to a single return main. Heat demand and pressure drop in each zone are about equal.

The returns, equipped with lubricated plug valves that can be adjusted, balance the pressure drop in the piping and equalize the temperature drop in the system. All risers have gate valves and drains for repairs. These valves are also used in balancing the flow.

Schedule 40 pipe is used in both the steam and hot water systems. All pipe joints on 3 in. diameter pipe and larger are welded. Expansion is compensated for by corrugated expansion joints and cold sprung offsets.

Heat Requirements Vary

The steam system heats the chapel, staff room, cafeteria, and some miscellaneous rooms, and supplies process steam where necessary. Temperatures are reduced in these rooms at night and when not occupied. The heat requirements of the corridors and entrances are quite variable. Therefore, automatically controlled steam convectors are installed to meet these needs.

Free standing steam convectors, either semi- or fully recessed, are used. The convectors have seamless copper tubes, nonferrous fins, and cast iron headers. Universal headers are also provided, permitting either top or bottom connection.

One in. diameter pipe is ample to carry the quantity of water required for the largest convector, although most of the run-outs are ½ in. The use of small connections is an advantage, not only in cost but also in greater flexibility for later expansion of the system.

The fully exposed convectors in the basement are wall hung, with sloping tops. All enclosures are provided with inlet and outlet grilles and knob control dampers.

All recessed or semi-recessed enclosures have ½ in. of rigid insulation fastened to their backs.

Convectors on the psychopathic floor are fully recessed, with 14 gage metal fronts and key operated dampers.

Each zone is supplied with a motor and turbine driven pump. The turbine is used in case of power failure and to improve the heat balance. There are two convertors for each zone, and these are used alternately. They are designed for 125 psig working pressure, with steam in the shell and water in the tubes.

A new eight apartment residence

Systems Heat 225-Bed Hospital

Unique heating arrangement provides forced circulation hot water to some areas, steam to others — both supplied by single operating boiler. Shell-and-tube convertors use steam to heat hot water. Other features include snow melting facilities, outdoor air supply, 30 tons of air conditioning for special needs.

for interns, about 300 ft from the hospital, is heated by exhaust steam and the return line is connected to the hot well in the hospital. This building requires 288,000 Btu per hr under design conditions.

Snow Melting Uses Steam, Water

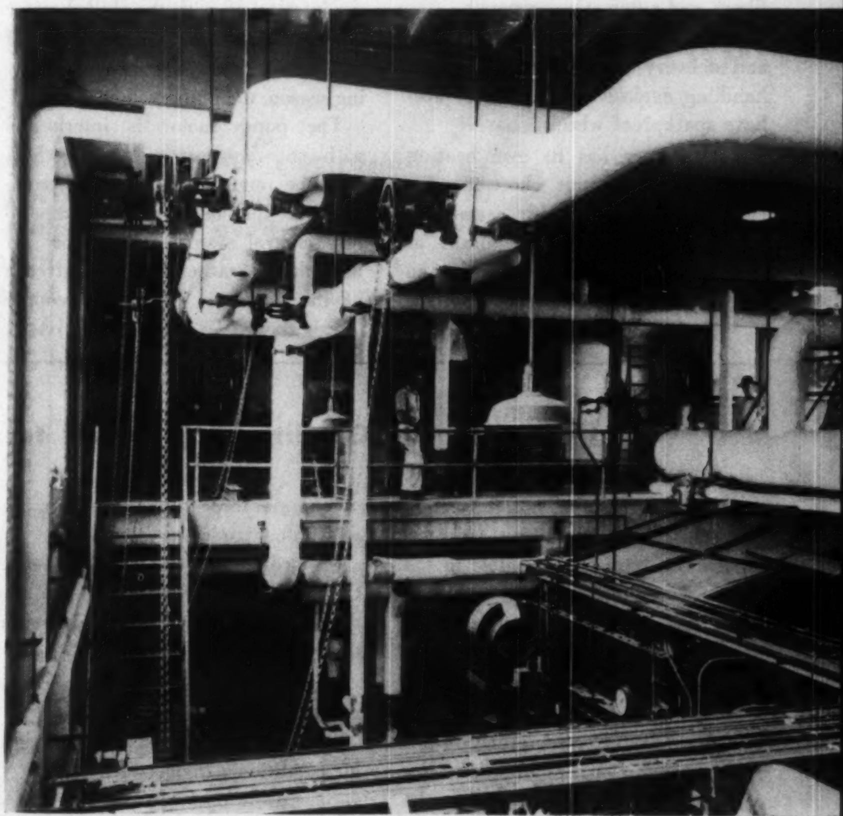
Snow melting coils are installed at the main entrance, parking area, and emergency entrances. The main entrance coils employ steam and consist of standard pipe suspended from beneath the steps. The parking and emergency entrances have serpentine coils, circulating a heated antifreeze solution.

The heat input for snow melting is approximately 100 Btu per hr per sq ft of paved surface. This keeps the surface clear when the snowfall is 1 in. per hr with an outside temperature of 26 F. The snowfall in Toledo is most frequent at 20 F. Aside from actual snowfall there is often an icing condition with a light mist or freezing in the early spring or late fall.

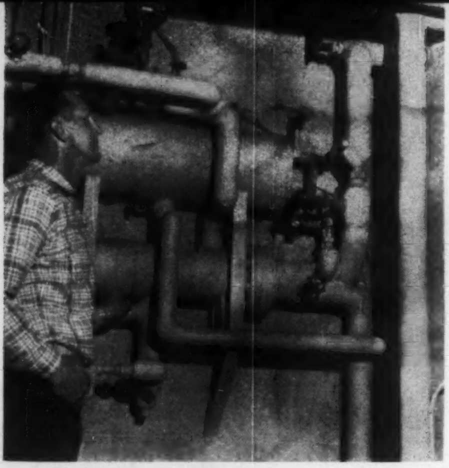
Water temperature is maintained between 130 and 140 F. A 40 percent ethylene glycol is used for an antifreeze. Water temperature is controlled by a steam regulator on the heater. The steam and circulating pump are turned off and on manually.

The building's ventilating system consists of four outdoor air supply units, together with air conditioning units and 18 exhaust fans. These are on the two floors of the penthouse.

Both intake and discharge of each outdoor air supply unit, air condi-



12 MILES OF PIPING convey hot water, steam. Piping at upper left carries steam to heat water, while that at upper right pipes steam for heating. All pipes are insulated



SNOW MELTING SYSTEM water temperature is maintained between 130 and 140 F. Water and 40 percent ethylene glycol is used as heating medium. Temperature is controlled by steam regulator on heater. Steam and circulating pump are turned off and on manually

tioning unit, and exhaust fan have suitable canvas connections. The kitchen range hood has asbestos cloth collars.

An automatic multiple louvered damper is installed at each outdoor air inlet to the air washers, air conditioners, supply fans, and exhaust discharge. Each damper opens when the fan is running and closes when it stops. Fusible link fire dampers are provided where the individual floor ducts enter the main duct shaft. Outdoor air supply units serve the kitchen, laundry, and corridors. Each consists of a blower, nonfreeze coils, filters, and automatic dampers.

The exhaust fans for the operating and delivery rooms are suitable for handling explosive fumes. They also have sparkproof wheels.

The nursery has its own heating and humidifying unit whose fan discharge is equipped with germicidal lamps. The humidifier evaporates at least 20 lb per hr of water with an entering air temperature of approximately 50 F and a delivered air temperature of 80 F. The unit is equipped with cleanable type filters and is provided with an access door in the intake plenum to facilitate removing the filters.

Air Condition Certain Areas

Air conditioning units are installed in the basement for the delivery, operating, and central supply rooms. Washers are installed ahead of each unit. These are of the vertical capillary type, for washing and humidifying only. The fan motors are interlocked with the chilled water pump so that whenever either one of the fans is running during the cooling season, the pump will operate.

The pump motor is interlocked with the compressor motors, so whenever the pump is running, the compressors operate from the temperature control system. The supply air to each air washer has preheat coils of the nonfreeze type, with copper tubes and fins and an inner steam distribution tube.

The compressors, using refrigerant No. 12, are the reciprocating multicylinder type, with long automatic type pistons and strip type spring loaded sections and discharge valves. Vibration isolators are provided to minimize the noise level.

Additional air conditioning units serve the fracture room, cystoscopic, plaster, and dark rooms. The compressors, also of the refrigerant No. 12 type, are hermetically sealed and direct driven. The compressors and motors are spring mounted to prevent vibration transmission. All piping connected to the compressors is composed of flexible metallic tubing.

The entire air conditioning system, i.e., the basement installed system plus the smaller self contained units, totals 30 tons of capacity.

The mechanical (heating, piping, and air conditioning) contractor for this installation was the Robert Carter Co. ⌗

Hospital Air Conditioning Grows to Highest Level

AIR CONDITIONING of hospitals is at its highest level in history. Currently, two-thirds of the hospitals in the U.S. either have air conditioning in some form or are planning to install it, according to a recent survey by *Modern Hospital* magazine.

Hospital air conditioning activity has shown its greatest growth since 1950. Carrier Corp. reports that sales of this type of equipment for the period are three times those for the entire four previous decades.

According to Charles V. Fenn, Carrier vice president, there are three major reasons for the increase this year:

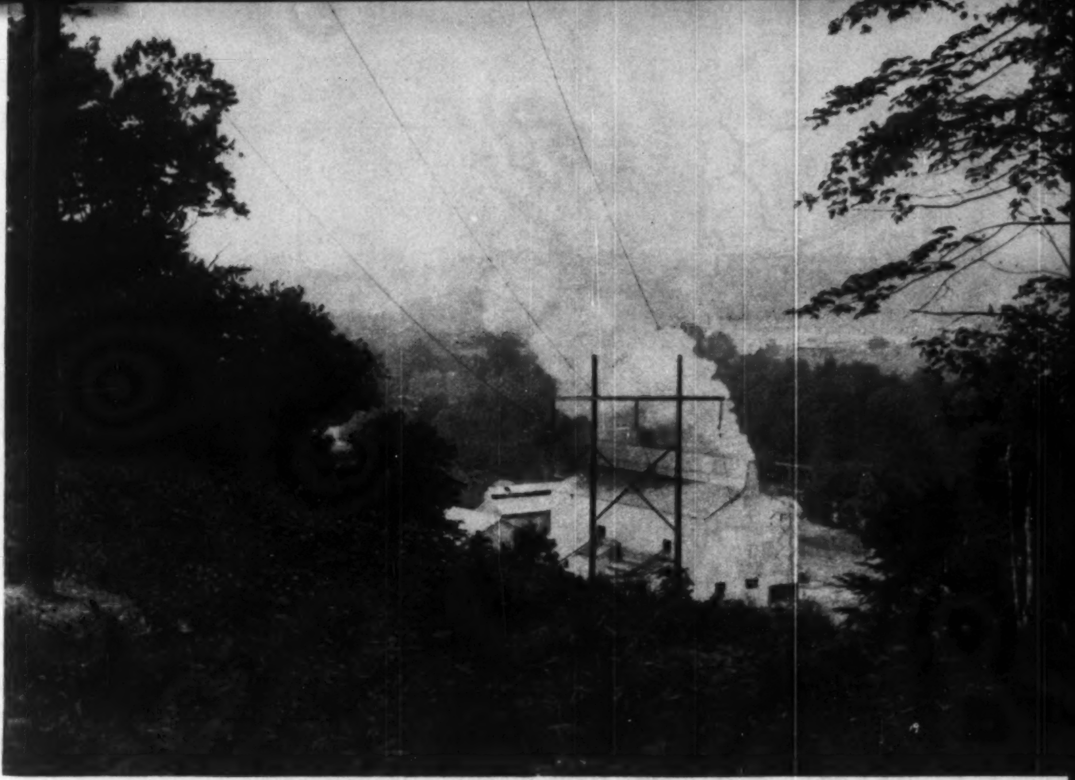
1) Air conditioning can shorten recovery periods in some cases

2) More patients are requesting air conditioned rooms

3) Encouraged by these facts, medical centers are speeding up long range air conditioning programs.

This year, hospitals will be the fourth largest category of "big" air conditioning installations behind new and existing office buildings and industrial plants, Mr. Fenn said.

He credited an absorption type refrigerating machine, which uses the steam found in every hospital, as contributing to the trend. ⌗



1 ELECTRIC FURNACES producing ferromanganese, such as are in operation in this recently constructed plant, create smoke and fume causing air pollution problem

Report New Method for Studying Air Pollution

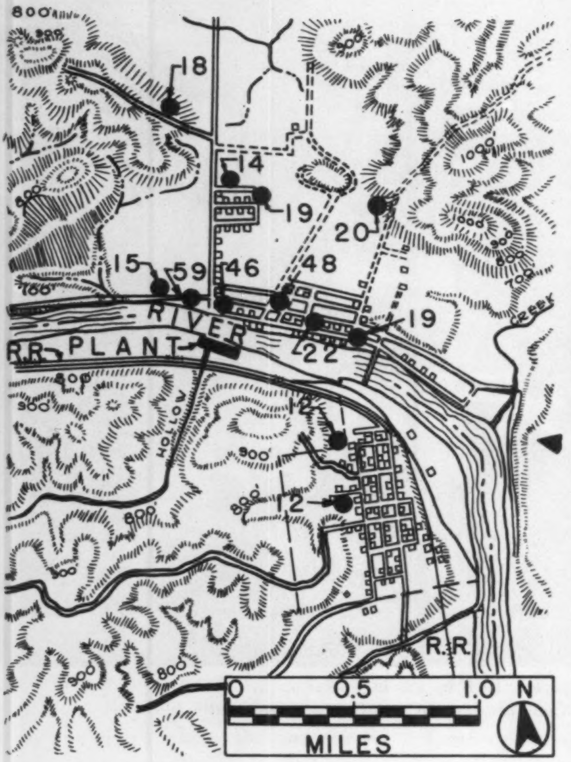
Procedure includes use of portable electrostatic air sampler and polyethylene canisters. For 10 months measurements were made of the contaminants from a ferromanganese plant. At 1 to 2 miles from the plant, total dust and fume averaged 1500 micrograms per cubic meter; manganese, 2 to 30 micrograms; and silica, 5 to 85 micrograms.

BY H. GARDNER BOURNE, JR.
Engineer-in-Charge
Div. of Industrial Hygiene
Ohio Dept. of Health

THE INDUSTRIAL BOOM in the Ohio River valley is the result of abundant coal, water, and suitable land and other advantages this area possesses. These natural resources have made possible low cost coal produced electricity, which in turn has attracted the aluminum and ferroalloy industries. Now between Steubenville and Gallipolis, Ohio, a distance of about 150 river miles, there are committed or in operation six electrometallurgical plants while on the Muskingum River, an Ohio tributary, there are two more.

The coming of the electrometallurgical industry has benefited the economy of the region. However, "Beautiful Ohio" has suffered from the resulting air pollution. In two instances economic gain has been offset by public rancour caused by smoke and fume from ferroalloy plants located in the respective communities. As a result an air pollution study in one of these two villages was undertaken.

It is true that at least one major producer of ferroalloys has some enclosed electric furnaces. The airborne waste from these furnaces is



2 AREA TOPOGRAPHY and physical relation of community to plant are shown here. Solid dots indicate location of "soot fall" stations, and the adjacent numbers indicate particle fallout in grains per sq ft per month

collected and cleaned in a four stage wet scrubber-fan unit before discharge to the outdoors. Installations of this kind have not been a source of trouble in Ohio. In contrast, the simple open top electric furnace producing ferrosilicon and especially ferromanganese is frequently guilty of discharging to the atmosphere huge quantities of smoke and fume.

An accounting of concentrations of manganese, silica, and total dust and fume to leeward of a plant making electric furnace ferroalloys has not to the author's knowledge been reported in the literature. Therefore, it is believed the contributing of such information will be of interest and help to others investigating air pollution.

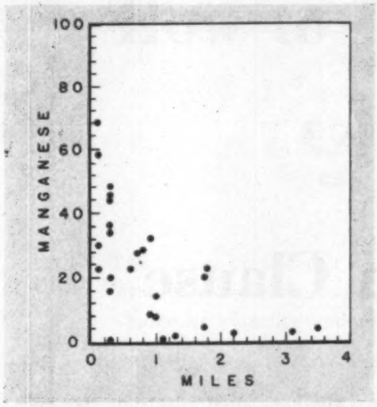
A typical building housing the electric furnaces and the way in which the fume escapes is shown in Fig. 1. This building was put up in 1955 and is representative of construction common to the plants hereabout. In the works illustrated ferromanganese is being manufactured. In the plant studied both ferromanganese and ferrosilicon are made.

Analyze Wind Directions

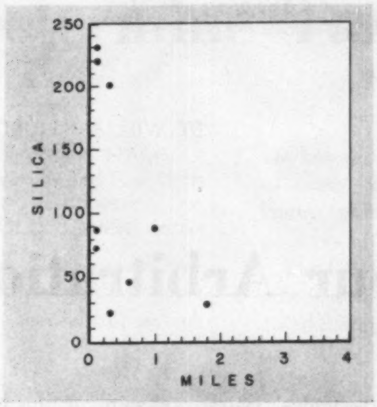
To understand the physical relationship of the plant to the complaining community and to grasp the nature of the topography, a sketch of the area under consideration is shown in Fig. 2. The strongest grievance was alleged by those living north and northeast of the plant. Their point was proven by an analysis of a 2 yr record of hourly wind direction observations which showed that the plant effluent was carried to the north and northeast most frequently and as much as 20 percent of the time to the northeast during the winter months.

3 PORTABLE ELECTROSTATIC AIR SAMPLER was among equipment used to collect metallurgical smoke and fume for analysis. Portability permitted sampling at many points in area

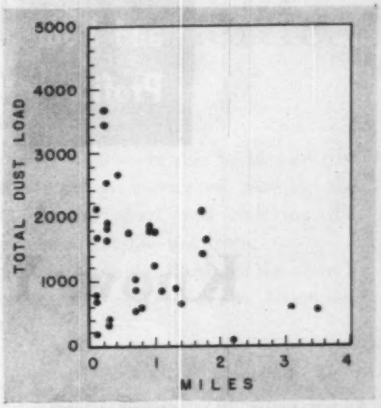
4 POLYETHYLENE CANISTER atop pole collected settleable airborne particles which were dried and weighed



5 MANGANESE CONCENTRATION in micrograms per cubic meter measured downwind was found to be as shown here



6 SILICA CONCENTRATION in micrograms per cubic meter was also measured downwind of ferroalloy plant



7 TOTAL DUST AND FUME was found in concentrations shown here in micrograms per cubic meter

The smoke and fume 300 ft downwind were collected using a thermal precipitator and the size of the particles determined using an optical microscope with 1000X magnification. It was found that 85 percent of the particles were less than 0.7 microns and 15 percent were smaller than 0.3 microns. The medium size was 0.4 microns. To efficiently collect these small size particles, a homemade portable electrostatic precipitator was used which could be run from a common 6 volt car storage battery. Frequently, to obtain enough airborne material for analysis, it was required to run 2 to 3 hr (240-360 cu ft) for a single sample. The collecting apparatus shown in Fig. 3 performed in a sturdy and reliable fashion both on calm and on blustery days and at temperatures from zero to 95 F.

Take Random Samples Weekly

Early in the work it was learned that the job would take forever if sampling was geared to a set weather pattern. Instead, a catch-as-catch-can policy was adopted by selecting at random one day a week for sampling regardless of meteorological conditions. This means that one sample may have been collected with the precipitator engulfed in the waste plume as it crept over the winter countryside, while at another time the apparatus may have been 1000 ft or more beneath a slowly drifting cloudlike smudge in a summer sky.

Many individual figures reported are too low. There was no way to bridle a flighty wind, nor was it possible to race around the compass. Hence, collecting apparatus frequently was not leeward during the entire 2 or 3 hr running time. In future work this uncertainty will be rectified by the use of a wind actuated directional off-and-on switch.

Analyze Concentrations

From March to the end of December 1955, 36 samples were collected and analyzed for manganese, silica, and total dust and fume. The concentration of each of these according to distance to leeward of the plant is shown graphically in Figs. 5, 6, and 7.

TABLE 1—MANGANESE concentrations at varying downwind distances from plant expose these segments of the population

Distance, miles	Manganese range, micrograms per cu meter	No. of persons*
0 — 0.2	26 — 33	50
0.2 — 0.5	22 — 26	700
0.5 — 1.0	18 — 22	200
1.0 — 2.0	6 — 18	50

*Duration of exposure 10 to 20 percent of time.

TABLE 2—ASHED, SETTLED DUST collected from all canisters during entire sampling period showed the following concentrations upon analysis, in grains per square foot per month

Manganese	2.3	Copper	0.03
Silica	6.2	Iron	3.3

In the case of manganese, which is known to be toxic, there has been worked out the association between downwind distance, range of manganese concentration, and approximate number of persons exposed in the community, as shown in Table 1.

Canisters Collect Dirt

It was also found necessary to obtain some measure of the quantity of "dirt" settling out of the air on porches and window sills in the village. This was accomplished by setting out open top, 56 fluid oz, 4 in. diam polyethylene canisters in the manner shown in Fig. 4. The collected material was dried, weighed, and the results expressed in grains per square foot per month. The position of these collectors is shown in Fig. 2, and the average monthly rate of dustfall from May to December 1955 is also indicated.

The total deposit in all canisters for the entire sampling period was combined, ashed, and analyzed. The findings are reported in Table 2.

Since no medical study was made of the level of health in this exposed community, no estimate of the hazard will be made. Nevertheless, it is believed that the environmental measurements in themselves are a contribution to our knowledge of one source of air pollution. ⌗

The Law and Your Profits

BY WILLIAM HURD HILLYER

Know Your Arbitration Clause

ARBITRATION CLAUSES in agreements between contractors concerning contracts for the U. S. Government should be carefully considered as they can present complex questions of law. In the following case the heating, piping, and air conditioning contractor lost a considerable sum of money due to such complexities.

Primus & Sons Co., a general contractor, was awarded a cost-plus, fixed-fee contract by the U. S. to erect certain plants and buildings for the Atomic Energy Commission. Secundus Temperature Co. in turn was awarded a subcontract by Primus to fabricate and deliver air conditioning systems.

A dispute arose in the performance of the subcontract as to whether Secundus was required to furnish the ductwork for exhausting air from the toilet and lounge rooms. Secundus claimed that this ductwork had not been included in the subcontract, but Primus contended that it had. With the controversy yet unsettled, Secundus furnished the disputed ductwork; then filed a claim with Primus for extra payment of $2622.

The subcontract between the two contained a *dispute clause* providing arbitration in case of disagreement.

The general manager of Primus & Sons, through an authorized person who made findings, disallowed Secundus' claims. In spite of this, Secundus took no appeal from these findings. However, nearly four months later he filed a petition in common pleas court. That court rendered judgment for Secundus, and Primus appealed.

The court of appeals saw the case as posing two questions: (1) Can Secundus bring an action of law after having failed to exhaust the remedy of appeal as presented in the dispute clause? (2) Was Secundus obligated to furnish the ductwork in question?

The trial court had held that Secundus had the right to bring action at law, regardless of the contract's arbitration clause. This contention was based on the theory that the right to appeal to the courts for redress of wrongs is an inalienable right under our constitution.

"The effect of this," the court stated, "is to say that such a provision in a contract is not binding on the parties. With this position we are unable to agree."

The court cited a recent decision interpreting the statute's provision for arbitration:

"Where parties to a building or construction contract agree to abide by the decision of an engineer or architect having supervision of such work as to the *amount*, quality, acceptability and fitness of the several kinds of work which are to be done and paid for under such contract, the decision of the arbitrator so designated is binding upon the parties, unless it is shown by clear and convincing evidence that such decision was based upon fraud, dishonesty, or collusion."

Another cited decision is even more specific:

"Where the parties to a present issue submit the same without objection to the determination of third persons, and participate in a submission by tendering data and expert evidence, and make no objection until after announcement of the result, neither party will be heard to complain thereafter that the issue was one which could not be arbitrated."

The appeals court then summed up by referring to the syllabus of a third decision. In this it was stated that the policy of the law is to favor and encourage arbitration. Every reasonable intention will be indulged to further the regularity and integrity of the arbitrator's act. The court pointed out that subcontractor Secundus had not claimed fraud nor bad faith on the part of the arbitrator, but had proceeded under the disputes clause of the contract until confronted by the arbitrator's findings.

Having reached this conclusion to the first question posed, i.e., could Secundus bring action without exhausting the remedy of appeal, the higher court deemed it unnecessary to give the second question any consideration. The judgment of the trial court was therefore reversed and Secundus was compelled to abide by the arbitrator's decision.

In the course of its opinion the appeals court stressed the fact that subcontractor Secundus had waited until the arbitrator's findings had gone against him before voicing protest or taking legal steps. Perhaps if he had been more prompt in his action the higher court might have taken a different view of his case. ⌗

WILLIAM HURD HILLYER, *author of this regular feature, is a contributor to a number of banking and financial publications and has written several books on business. He has an extensive practical legal and financial background.*

This series presents actual cases. All names are fictitious. It should be remembered that laws vary in different states.

How to Determine Tank Capacities

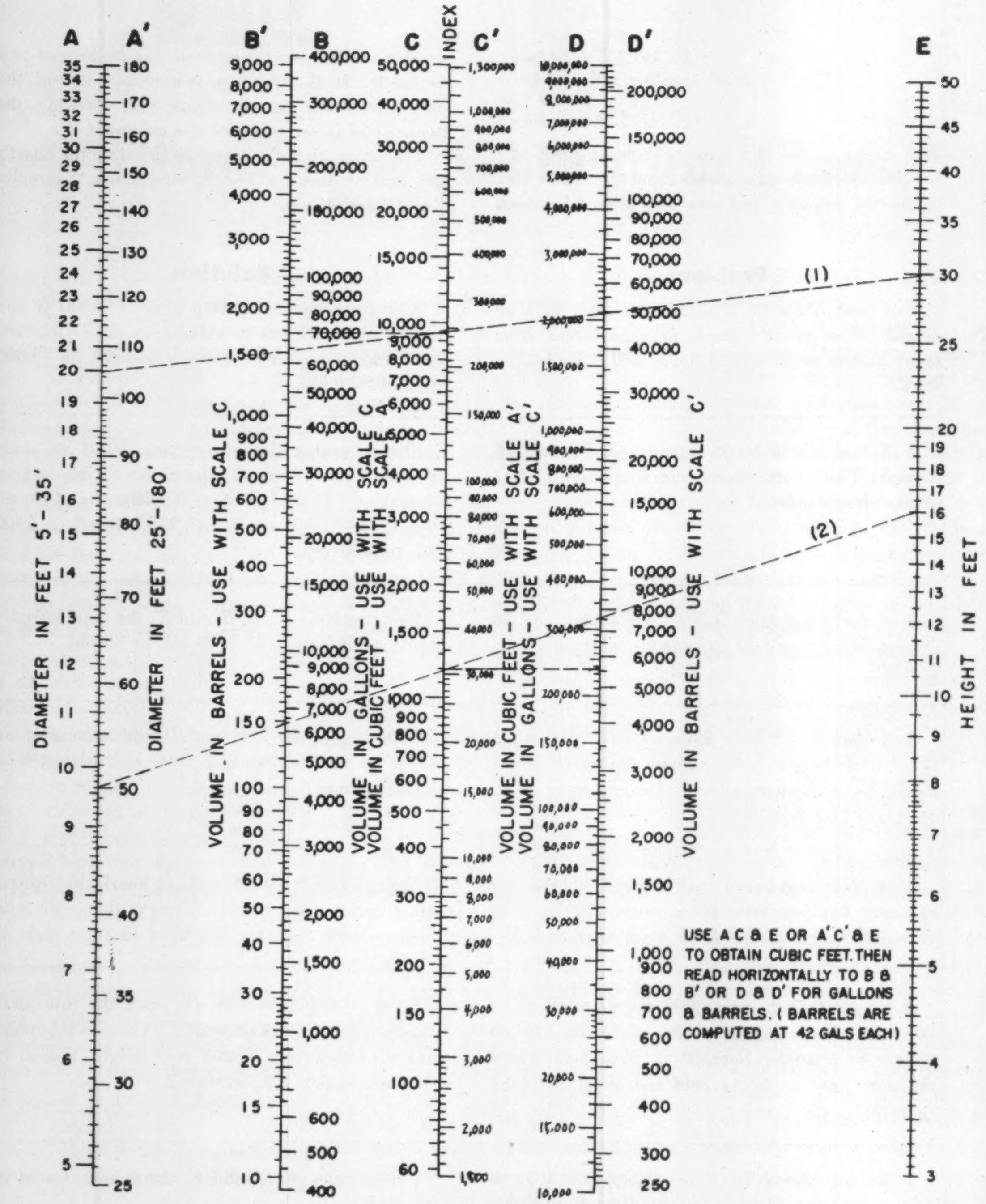
BY WILLIE HAMMER
Chief, Heating and Fuel Units
Engineering Div.
HQ, U. S. Army, Japan

THE CHART on the next page provides a quick way for finding tank volumes and capacities. Also, if a volume or capacity and one dimension of a tank are known, the other dimension can be located just as easily. It is simply a matter of plotting the known elements on the chart and checking the point(s) of intersection for the unknown.

The following eight examples illustrate the chart's practical application. For easy reference, Examples 1 and 2 are plotted.

Problem	**Solution**
1 *A tank has a 20 ft diameter and is 30 ft in height. What is its volume in cubic feet? How many gallons or barrels of liquid will it hold when filled?*	A straight line connecting scale *A* at 20 ft and scale *E* at 30 ft gives its volume (scale *C*) as 9420 cu ft and its capacity (scales *B* and *B'*) as 70,460 gal and 1678 bbl.
2 *A tank has a 50 ft diameter and stands 16 ft high. What is its volume and how many gallons or barrels will it hold?*	Plot a straight line connecting 50 ft on scale *A'* and 16 ft on scale *E*. The points of intersection on scales *C'*, *D*, and *D'* show the volume and capacities to be 31,400 cu ft and 235,000 gal or 5600 bbl, respectively.
3 *A horizontal tank is 5 ft in diameter and 10 ft long. What would be its capacity when completely full?*	Using scales *A*, *C*, *E*, *B*, and *B'*, the tank capacity would be 196 cu ft, or 1460 gal, or 35 bbl.
4 *A tank is 40 ft in diameter and 30 ft high. What is the approximate number of barrels which would be in the tank when it has oil to the 10 ft, 15 ft, and 25 ft levels?*	Using scales *A*, *C*, *E*, and *D*, the amount of oil would be 2240, 3360, and 5600 bbl, respectively, at those points.
5 *A plant requires a tank to hold 100,000 gal of water but has room for a tank only 30 ft in diameter. How high would the tank have to be?*	From 100,000 gal on scale *D*, mark the equivalent number of cu ft on *C'*. Connect this point with 30 ft on scale *A'*; read height of 19 ft on scale *E*.
6 *An oil tank to hold 3000 bbl of oil is to be located inside a circular dike which can be no greater in diameter than 60 ft. How high would the dike have to be to hold the oil if the tank ruptures?*	From 3000 bbl on scale *D'*, mark the equivalent number of cubic feet on scale *C'*. Connect this point with 60 ft on scale *A'* and read height of 5.95 ft, or approximately 6 ft, on scale *E*.
7 *An excavation 10 ft in diameter and 12 ft deep is to be made for a cistern. How many cubic feet of earth must be removed?*	Using scales *A*, *C*, and *E*, the answer would be 943 cu ft.
8 *A brick stack is 150 ft high with an average inside diameter of 7 ft and outside diameter of 9 ft. How many cubic feet of brick work are in the stack?*	Use 15 ft on scale *E* and multiply the final results by 10. Connect 15 ft on scale *E* with 9 ft on scale *A*. Read 943 on scale *C*. Connect 15 ft on scale *E* with 7 ft on scale *A*. Read 577 on scale *C*. The answer is $(943-577)10 = 3660$ cu ft.

Tear out along this line



USE A C & E OR A' C' & E TO OBTAIN CUBIC FEET. THEN READ HORIZONTALLY TO B & B' OR D & D' FOR GALLONS & BARRELS. (BARRELS ARE COMPUTED AT 42 GALS EACH)

NOMOGRAPH eliminates tedious calculation in determining tank volumes and dimensions. Examples on preceding page show how it works, illustrate its practical application

HEATING, PIPING & AIR CONDITIONING

JOURNAL SECTION

OF

AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS

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Heating, Piping & Air Conditioning, March 1958

President's Message

ASHAE – *ASRE* Merger Proposed

At its meetings in Pittsburgh on January 26th and January 30th, 1958, the ASHAE Council approved in principle and for further detailed study a Merger Plan for ASHAE and ASRE, proposed by the ASHAE-ASRE Committee on Cooperation. Similar action was taken by the ASRE Council on January 26th. These actions were announced in a joint Press Release dated January 28, 1958, the full text of which appears in this issue of the JOURNAL on page 179.

I am here briefly setting forth The Background of the plan, The Merger Plan, and the Means for Evaluation by the membership.

THE BACKGROUND: Both Societies were organized around the turn of the century. In the early days the principal interest of ASHAE was heating and ventilating, whereas ASRE dealt primarily with refrigeration and cold storage. The advent of air conditioning drew both Societies into the same sphere of professional activity. During the phenomenal growth of the profession and its allied industries there have been many mutual technical interests which have encouraged the development of an overlapping membership. Over the past two decades the two groups have come closer together, in fact around a quarter of a century ago, Dr. Willis H. Carrier, a Past President, proposed that the two Societies merge. In 1941 an exchange of publications was started. In 1954, the ASHAE-ASRE Committee on Cooperation was appointed, and its deliberations produced the presently proposed Merger Plan.

THE MERGER PLAN: The plan contemplates a merger of the two Societies into a single Society with an Officer and Directorate structure similar to the structures of the present Societies. The many fine traditions of these long standing organizations will be retained. All the assets of the two groups would be transferred to the merged Society. Research would be increased in scope and expanded.

A Journal will be supplied to all members. A Guide or Data Book will be provided each year and the TRANSACTIONS will also be made available. The Local Chapters will be aided with funds from the National level and the services to members will be improved.

All this is contemplated within the structure of our present dues. In view of deficit financing both last year and this in the non-research activities of the Society, we must either find new sources of funds, curtail services or consider the savings effected by a merger, as means of relieving the financial stress. Though operating surpluses from earlier years are being used for the time being, financial changes are soon essential.

MEANS FOR EVALUATION: In evaluating the plan, the chief question to be answered is "What benefits do the INDIVIDUAL MEMBERS derive from the Merger Plan?"

The Regional Directors of ASHAE are acquainted with the Merger Plan and it will be made the subject of intensive discussion at the meetings of the Chapters Regional Committees and at Chapter Meetings this spring. As the Merger Plan unfolds, I shall discuss it in future Messages. The detailed plan, after approval by the Council, will be referred to the membership for a decision. At that time, each member will receive by mail a description of the Merger Plan so that he will be informed thereon prior to his voting. A two thirds majority of those voting by proxy or in person is required for its approval by the membership. Concurrence of the Supreme Court of the State of New York is also needed. Your earnest consideration of this Merger Plan will be requested.

E. R. Queer

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Information on other Society personnel can be found on page 184.

Heating & Air Conditioning a Civilian Airport

By

Charles Broder

The author is Mechanical Engineer, The Port of New York Authority, New York, N. Y. A presentation at the Symposium on High-Temperature Water at the 64th Annual Meeting of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, Pittsburgh, Pa., January 28, 1958.

PREVIOUS speakers have adequately covered the many technical aspects in the application of high-temperature water in many fields. The economic problems and their analysis that are pertinent to the use of this medium were also discussed clearly and in considerable detail.

It is proposed here to illustrate the high-temperature water applications that can be applied to the growing airports of the country. Its application in this field is so versatile that it need not depend on the season of the year but can be used the year-round.

Use of high-temperature water at a civilian airport on a large scale is new in this country, although it is used for heating purposes at military installations. Actually, the New York International Airport is the first civilian facility to attempt a large installation of this type. It was in the planning of the use of this method of central heating that the possibility of using high-temperature water to provide basic cooling within the same areas was evolved.

The ever increasing use of the airplane in the transportation of passengers and goods throughout the world has been placing an increased burden and responsibility on the airlines serving, not only this country, but the airlines between our nation and our friends abroad.

The airlines have responded to their responsibilities by continually expanding their services and increasing the number of aircraft of all types to take care of the varied demands for passenger and air cargo space. The increased number of flights and the growth in size of the airplanes has also placed a responsibility on airport designers, builders and operators to expand their facilities to take care of the increased traffic.

The Port of New York, served by the 4 airports in the area, New York International, Newark, La Guardia and Teterboro, illustrates the growth of air travel. From 1948 until the end of 1956, passenger travel at these terminals increased every year, and from 3,572,000 to 12,100,000 people. This is a growth of 340 percent in 8 years. In the same interval of time, the cargo movement through these terminals increased from 137,184,000 lb a year to 323,129,000 lb a year. This represents a growth in cargo operations of 236 percent. It is anticipated that air travel will continue to grow at increasing rates. What is happening in the New York area indicates what is happening throughout the country and, in varying degrees, over the world.

Civilian airports are becoming increasingly larger with the rapidly expanding requirements for passenger and air freight space. There is a continuing demand for additional passenger terminals and facilities, cargo storage space, freight handling and distribution areas, operational hangars, maintenance hangars and various types of industrial buildings for businesses serving the aircraft industry. The planning and construction of these facilities has become a major problem for the builders and operators of the airports in all communities.

Over the years, studies of these requirements, in which the airlines participated, indicated very definite trends in airport development. These were:

1. *Large passenger terminals for 24-hr a day and year-round operation*: In fact, most of the larger airlines are building large passenger terminals for their own use because of the large volume of passenger business. These buildings generally have incorporated, for passenger use and comfort, extensive lounge areas, coffee shops, restaurants, various retail stores, baggage rooms and other facilities. Most of these areas require year-round air conditioning. There are also requirements for steam, domestic hot water and special applications particularly in the food service areas.

2. *A number of large freight-cargo operation and distribution buildings*: These areas to be used for temporary storage, redistribution of cargo, receipt and forwarding of freight. All areas require heating facilities. The offices and special areas demand air conditioning. In some cases, special applications for heating or cooling are required.

3. *Operational and maintenance hangars for the individual airlines for readying the aircraft for flights and for all types of maintenance and overhaul*: The hangar areas require heating and some hot water and steam for the crews working on the airplanes. The office areas, briefing rooms and certain instrument repair rooms are air conditioned throughout the year.

4. *Industrial buildings for use in the production of parts and controls peculiar to the needs of the airlines using the airport.* The shop areas must be heated and supplied with hot water and steam for operational use. The office areas generally require year-round air conditioning and domestic hot water.

The type of buildings used are generally compatible so that they can be grouped into natural area patterns adaptable for central heating and cooling systems. High-temperature water and chilled water can readily be generated at a single location and transmitted to the using facilities. In each grouping, the building locations and the large areas involved are quite suitable for the use of underground transmission lines.

Where the patterns can be established, definite economic and physical considerations point to the use of the central station type of installation. Generally, the following factors govern the ultimate decision in establishing a plant:

1. The need, in varying degrees, for heating, domestic hot water, industrial hot water and steam, all of which are available through the use of high-temperature water and appropriate heat exchangers and controlling devices.

2. The need for chilled water to flow through the coils of the air handling units to provide air conditioning. The ease of producing the chilled water with the use of absorption refrigeration machines using high-temperature water as the generating medium. The use of a high-temperature water to steam generators to produce steam at about 60 psig which can be used for either driving the turbine on a centrifugal refrigeration machine or in the generator of an absorption machine.

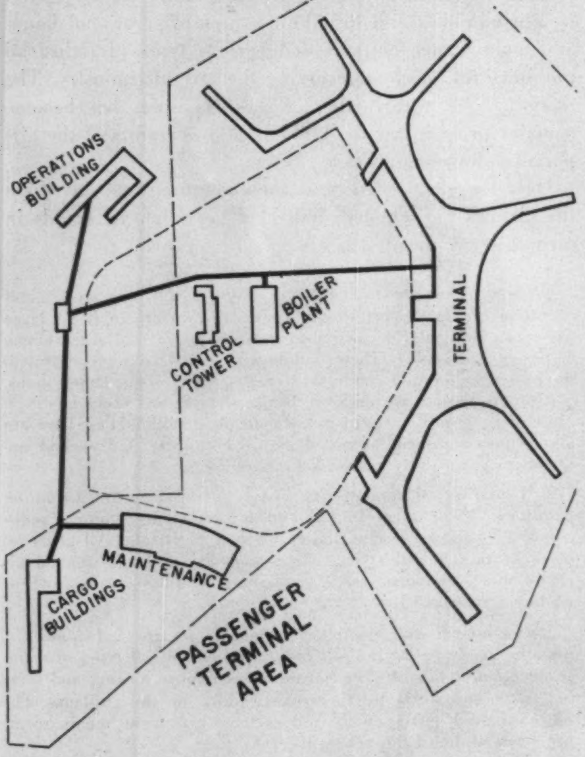

Fig. 1 — Diagram of a typical terminal area

3. Use of large transmission piping for the hot and cold mediums which flow to the buildings.

4. The desirability of eliminating or minimizing the number of boiler flue pipes and stacks throughout the area and reducing the soot and dirt on the grounds and the buildings.

5. Saving in construction costs by providing 1 central boiler and machine room rather than a number of plants in the area and the elimination of duplicate equipment.

6. The saving in operating costs by consolidating all operations under one roof with the exception of minor equipment in the buildings serviced.

The illustrations show how a central plant in specific areas can provide all of the hot and cold water that would be needed for the various facilities.

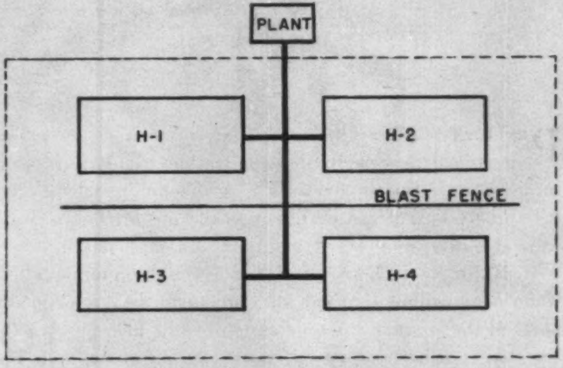

Fig. 2 — Diagram showing a typical hangar area

Fig. 1 shows a typical terminal area with all of the attendant buildings. Shown are the main passenger terminal or terminals, control tower, operations building, small cargo building and the power plant or central plant. The transmission lines for the hot and cold water pipes are also shown. These lines can either be run underground or above ground. For appearances, the lines should be underground where possible. The method of running the lines, insulation, anchorages, expansion loops or joints and other construction details would be dependent on the type of ground and location conditions.

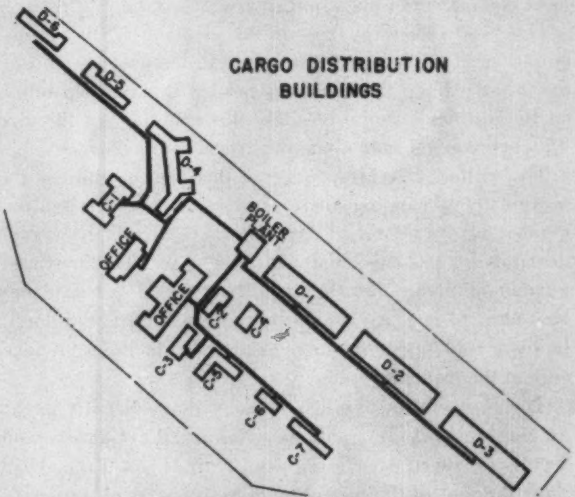

Fig. 3 — Grouping of buildings in a typical cargo distribution area

Fig. 2 indicates what may be a typical hangar area. Each hangar may be operated by a single airline or jointly by several lines. The requirements for hot and cold water will be the same in either event. Shown on this diagram are several hangars, the central plant and the transmission lines for the hot and cold water.

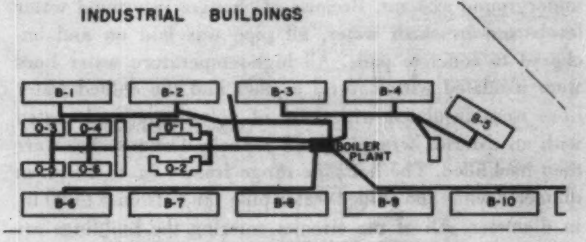
INDUSTRIAL BUILDINGS
B-1
B-2
B-3
B-4
B-5
O-3
O-4
O-1
BOILER PLANT
O-5
O-6
O-2
B-6
B-7
B-8
B-9
B-10

Fig. 4 — Typical group of industrial buildings to provide equipment maintenance and parts to airlines

Fig. 3 illustrates a grouping in a Cargo-Distribution area. Here are a number of distribution buildings for the movement of cargo, storage buildings for the temporary storage of cargo, small office buildings for control of the area, the central plant and the transmission lines to the various buildings.

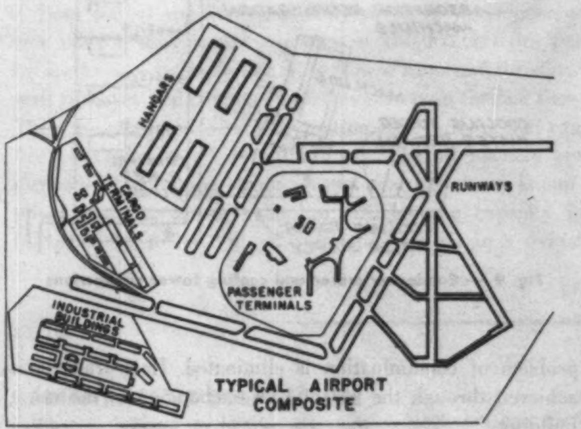
HANGARS
CARGO TERMINALS
RUNWAYS
PASSENGER TERMINALS
INDUSTRIAL BUILDINGS
TYPICAL AIRPORT COMPOSITE

Fig. 5 — Airport composite showing arrangement of the typical groups of Figs. 1 to 4 and the location of runways

Fig. 4 shows what may be considered a grouping of industrial buildings to provide maintenance equipment and parts to the airlines operating at the airport. Indicated are a number of shop and industrial buildings, some office and general supply buildings, the central plant and the transmission lines.

Fig. 5 is a composite of all 4 of the previous areas and also shows the runways and taxiways that would be included in a modern airport. Although not indicated in this sketch, a large central plant could be built in any suitable area and it could supply high-temperature water and chilled water through underground transmission lines to all of the buildings in the airport. The size of the plant, the extremely large pipe, the overall length of the transmission lines and the economic factors involved in construction would have considerable weight in any decisions to build such an installation. The construction of one plant for the airport *vs* the construction of a few plants for the several areas must also be considered from the standpoint of economics and utility. There is no pattern that can be said to be applicable to all airports. Each must be considered as a separate problem.

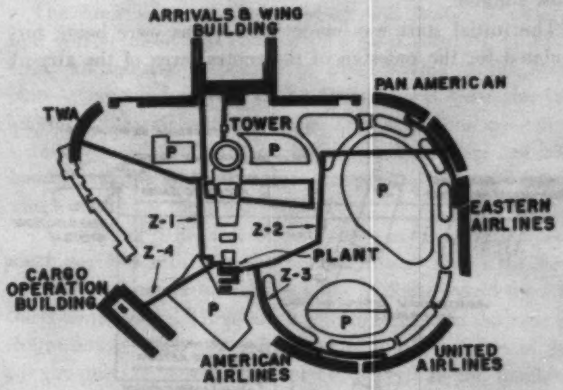
ARRIVALS & WING BUILDING
PAN AMERICAN
TWA
TOWER
P
P
P
P
P
P
EASTERN AIRLINES
Z-1
Z-2
Z-4
PLANT
Z-3
CARGO OPERATION BUILDING
AMERICAN AIRLINES
UNITED AIRLINES

Fig. 6 — Control terminal area of the New York International Airport showing location of heating plant and high temperature water lines

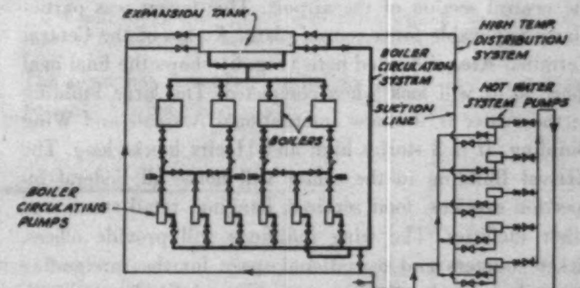
EXPANSION TANK
HIGH TEMP. DISTRIBUTION SYSTEM
BOILER CIRCULATION SYSTEM
HOT WATER SYSTEM PUMPS
SUCTION LINE
BOILERS
BOILER CIRCULATING PUMPS
DISCHARGE LINE
HEAT LOAD RETURN FROM VALVE PIT
HEAT LOAD SUPPLY TO VALVE PIT

Fig. 7 — Schematic of portion of central plant wing showing hot water generating boilers, circulating pumps and auxiliaries

For a number of years, the Port of New York Authority has been investigating the possibility of using high-temperature water as a heating medium at the International Airport.

An extensive survey was made of the different area-type installations and the use of one central system to take care of the entire airport. For the New York International Airport, it was found that area-type central plants would be most suitable.

The initial start was made when plans were being formulated for the redesign of the central area of the airport as a terminal area. The plans called for a number of terminal buildings to be placed around an oval shaped plot in the central section of the airport. This layout was particularly applicable for a central plant. A plan of the Central Terminal Area indicated here (Fig. 6) shows the final oval space as it will look when completed. The large building in the center is the new International Arrivals and Wing Building. It is 3 stories high and 11 city blocks long. The Arrival Building in the center will house all Federal inspection services, food services, banking, retail stores and other facilities. The wing buildings will provide offices, ticket counters and operational space for the foreign-flag lines. Around the perimeter of the oval lie the terminals for the United States flag-lines, the site of the temporary terminal, the present cargo-operations building. The entire area is landscaped and has a complete network of roads leading to all the buildings. The area also has a number of fountain pools and reflecting pools shown in the center of the oval.

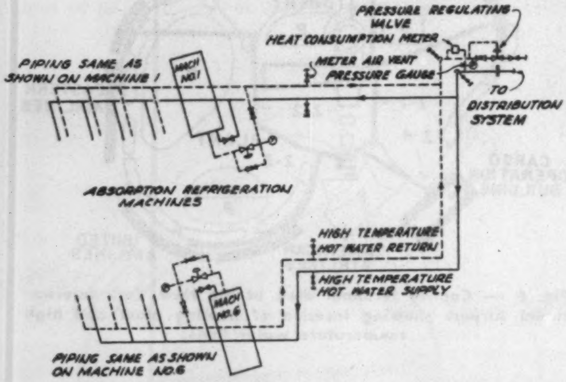
PRESSURE REGULATING VALVE
HEAT CONSUMPTION METER
PIPING SAME AS SHOWN ON MACHINE 1
MACH NO.1
METER AIR VENT
PRESSURE GAUGE
TO DISTRIBUTION SYSTEM
ABSORPTION REFRIGERATION MACHINES
HIGH TEMPERATURE HOT WATER RETURN
HIGH TEMPERATURE HOT WATER SUPPLY
MACH NO.6
PIPING SAME AS SHOWN ON MACHINE NO.6

Fig. 8 — Typical arrangements at 9 absorption refrigeration machines located in long wing of central plant building, showing arrangements for supplying hot water to machines and return to boilers

The central plant located in the perimeter eliminates the necessity of constructing, operating and maintaining facilities in each of the buildings. Cleanliness of the overall area, saving of valuable space in each terminal for airline operations, minimum maintenance and operational costs through use of the central plant were some of the reasons for its final adoption. The transmission lines indicated on the plan actually have 3 high-temperature water lines and 2 chilled water lines going to each zone. Because of the overall construction schedule and the pumping problems encountered, the zoning system as indicated was adapted. There is a total of over 6 miles of high-temperature water piping and over 4 miles of chilled water piping in the underground systems. Because of changes in ground water levels and brackish water, all pipe was laid on and anchored to concrete pads. All high-temperature water lines were insulated with natural asphalt and the chilled water lines were insulated with 1-in. of polystyrene and coated with an exterior wrapping and asphalt. The trenches were then backfilled. The hot pipe range from 4 in. to 10 in. in diameter while the chilled water pipe range from 5 to 20 in. in diameter. All of the circuits entering the buildings are completely closed so that there will be no loss of water that would require make-up and treatment. Additionally, the problem of contamination is eliminated. Heat transfer is achieved through the use of heat exchangers in the using building.

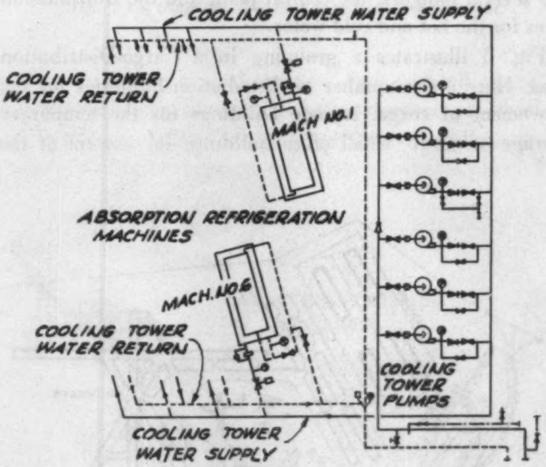
COOLING TOWER WATER SUPPLY
COOLING TOWER WATER RETURN
MACH NO.1
ABSORPTION REFRIGERATION MACHINES
MACH. NO.6
COOLING TOWER WATER RETURN
COOLING TOWER PUMPS
COOLING TOWER WATER SUPPLY

Fig. 9 — Condenser water and cooling tower connections

The central plant is an "L" shaped building consisting of a 180-ft refrigeration wing and a 100-ft boiler wing. In the boiler wing (Fig. 7) are located all the high-temperature water generating boilers, the systems circulating pumps feeding the user buildings, the boiler feed pumps, expansion tank and all the accessories and auxiliaries required to operate the plant to produce the high-temperature water. Included in this additional equipment are oil heating and pumping sets, steam generator, water treatment, deaerator and extensive control equipment that will effect complete control of output, firing rates, fuel-air ratios and boiler balance in performance. The diagram shows the circuiting of the water through the various systems and through the boilers. The systems pumps circulate the water from the expansion tank to the transmission lines and the buildings and back to the boilers and expansion tank. The boiler pumps circulate the water from the systems and expansion tank through the boilers to the expansion tank.

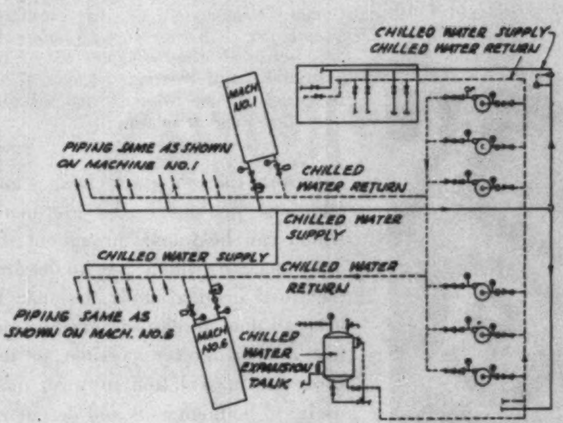

Fig. 10 — Circuit diagram of chilled water piping in central plant

Four forced circulation, high-temperature water generators with a total output capacity of 160,000,000 Btu per hr are housed in the boiler wing. These have radiant water wall furnaces and counter-flow economizers in the last pass. They are equipped with combination type burners and can fire either No. 6 oil or natural gas. The oil burners are mechanical-atomizing steam-assisted and the steam is supplied from the steam generator. Oil storage capacity is furnished by a 210,000 gal spheroid tank set in a dyked area near the plant. Hot water is generated at 250 psig and 400 F but water at only 380 F is sent through the transmission lines. The load is expected to be stable throughout the year by the use of absorption refrigeration machines to provide cooling capacity to the area, using the hot water as the generating medium.

The long wing of the building will house 9 absorption refrigeration machines with a total capacity of 6200 tons. An interesting feature of the building is the large plate glass window that is 22 ft high and runs the full length of the refrigeration wing. This will allow spectators a full view of the plant operation. In this wing are also housed all the chilled water pumps and the condenser water pumps for these machines.

Fig. 8 shows the flow of hot water to the refrigeration machines and return to the boilers. Fig. 9 shows the flow of condenser water to the machines and the connections to the cooling towers. These are 2 towers located in the rear of the building. Each tower has 3 cells and is capable of approximately 20 percent greater capacity than the machine loads.

The chilled water circuiting diagram (Fig. 10) shows the pumps and the machines and piping required in this closed system. The pumps circulate the chilled water through the machines, transmission lines and the coils in the air handling units in the buildings.

Flow capacities are as follows for the plant:

1. *Hot Water*: 160,000,000 Btu per hr, 1,140,000 lb per hr pump capacity, 160 ft head, 380 F flow, 240 F return.
2. *Chilled Water*: 6210 tons, 16,800 gpm pump capacity, 150 ft head, 55 F to 45 F cooling range.
3. *Condenser Water*: 24,600 gpm pump capacity, cooling tower capacity for rated flow from 102.4 F to 85 F with wet-bulb at 78 F.

The plant has just been started so that no operational experience has been had as yet.

RADIANT HEATED SOLAR HOUSE

What is believed to be the first fully solar heated house in Los Angeles, Calif., contains some 2000 sq ft of floor surface and is presently under construction. No auxiliary or supplemental heat is planned for, and it is expected that the sun will supply all the heat required for comfort. The installation includes a buried tank for heat storage and the storage can be drawn on to supply fluid to the floor panel-heated system. The house also is planned to contain an outdoor dining area which is also to be radiant heated.

MILLS GOES TO MEMPHIS

D. M. Mills, vice president of F. J. Evans Engineering Company and in charge of its Houston Division, reports that he has been commuting between Memphis and Houston for the past several months. This is because he is being made division manager of the new Western Division of F. J. Evans Engineering Company with headquarters in Memphis.

Although he continues to reside in Houston, Mr. Mills has an office in Memphis. At the recent January Meeting, he also completed a period of three years as member of the Council of the Society.

OSBORNE BECOMES PARTNER

Stanley R. Osborne, West Cheshire, Conn., has been made a partner in the firm of Hubbard, Lawless and Blakeley, consulting engineers in New Haven, Conn. Mr. Osborne has been a member of the Society since 1939, and during 1947 he served as president of the Connecticut Chapter.

GORDON ACTIVE ON EJC BOARD

Past Pres. P. B. Gordon, New York, N. Y., as the Society's representative was present at the closing meeting of the 1957 Board of Directors and also at the organization of the new Board.

Mr. Gordon served as ASHAE representative on the *EJC* Board during 1957 and continues the second year of his appointment during 1958. Among the projects on which he was active during 1957 was that in connection with the proposed incorporation of *EJC*.

THE ASHAE GUIDE 1958

The 1272 pages contained in the Technical Data Section of the new edition of THE GUIDE makes it the largest ever published. No realistic amount of reviewing and condensing of the technical data section in recent years has resulted in the number of pages being reduced. It seems to be the case that worthwhile and needed technical information continues to appear so rapidly that the only way to make it available is to expand the amount of space devoted to it in each successive edition.

As is usual, the technical data section is compiled from all available sources. Included are data from the ASHAE Research Laboratory program; from the experience and practice of Society members as well as other engineers; from other engineering societies, trade associations and industrial and institutional laboratories. Every effort is made not only to keep all information useful and carefully revised, but to insure its accuracy, compactness and authenticity. Several of the Technical Advisory Committees of the Society have contributed to and reviewed topics within their field of interest. Members of the staff of the Research Laboratory of the Society have also compiled data and aided in the preparation of some of the revisions. The task of co-ordinating and guiding the whole project of preparing the technical text is under the direction of the Guide Committee, whose members are: M. W. Keyes, *chairman;* H. W. Alyea, W. P. Chapman, R. C. Chewning, J. R. Duncan, R. A. Gonzalez, N. B. Hutcheon, R. L. Maher, D. W. Nelson; H. A. Lockhart, *ex officio;* and Carl H. Flink, *technical secretary.*

Among the revisions and additions to the technical data which are of particular interest are (1) addition of both a description and a design method for high velocity air duct systems, (2) an enlarged section on the heat pump, (3) new information on exhaust hood performance and design for hot and cold processes, (4) a simplified presentation of industrial drying principles, calculations, and system design, (5) extension of data on heavy fuel oils and their use, with preheating, in automatic fuel burning equipment, (6) new data on heat gain through glass block used in skylights, requirements for shading glass, and basic principles involved in calculating heat flow through glass areas, (7) a general revision of the chapter on radiators, convectors, baseboard, and finned-tube units and addition of new data on their ratings, and performance, (8) a revision of ranges of capacity for electrical heating units and a method of determining operating cost for these units, (9) an enlarged section on performance and testing of air cleaners, (10) extension of list of allowable concentrations of air contaminants, (11) an increased number of codes and standards of interest to users of THE GUIDE.

GUIDE
1958
HEATING VENTILATING AIR CONDITIONING
GUIDE
1958
EDITION

These changes appear in the following chapters: *Chapter* 8 — Air Contaminants; *Chapter* 13 — Cooling Load; *Chapter* 14 — Fuels and Combustion; *Chapter* 15 — Automatic Fuel Burning Equipment; *Chapter* 16 — Heating Boilers, Furnaces, Space Heaters; *Chapter* 22 — Radiators, Convectors, Baseboard and Finned-Tube Units; *Chapter* 29 — Central Systems for Air Conditioning; *Chapter* 31 — Air Duct Design; *Chapter* 33 — Air Cleaning; *Chapter* 36 — Refrigeration; *Chapter* 41 — Electric Heating; *Chapter* 45 — Industrial Exhaust Systems; *Chapter* 47 — Industrial Drying Systems; and *Chapter* 53 — Codes and Standards.

Beyond the important changes and additions just mentioned are many which can be found throughout the Text Section which has undergone the usual detailed study designed to keep all data abreast of current practice, and wherever possible to improve its presentation in ways most useful to both students and designers.

The general format of the Text Section is preserved and is arranged into 7 sections as in earlier editions, *viz:* I — Fundamentals, II — Human Reactions, III — Heating and Cooling Loads, IV — Combustion and Consumption of Fuels, V — Systems and Equipment, VI — Special Systems, and VII — Instruments and Codes. This continuity of arrangement from edition to edition is beneficial to users of successive editions.

The *Catalog Data Section* is also presented in the same general format as in earlier editions with all equipment data revised and brought up to date. It contains both descriptive information on available equipment and data on performance and space required for applications.

Since a reference book must permit ready location of desired information, THE GUIDE is carefully indexed throughout including both the Text Section and the Catalog Data Section. Included also is a 24 × 32-in. ASHAE Psychrometric Chart in a pocket in the back cover.

[HEATING VENTILATING AIR CONDITIONING GUIDE, 1958 *36th Edition, 6 × 9 in., blue cloth bound, gold stamped,* AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, 62 *Worth St., New York* 13, *N. Y., single copy price* $12.00]

Activated Charcoal for Air Purification

By H. L. Barnebey*, Columbus, Ohio

Activated charcoal adsorption is a positive method for the control of odors and other unwanted vapors. It can be used in almost every situation where contaminants in vapor form should be removed from an enclosed space. To be effective, the system must be correctly designed and properly maintained.

The object of this paper is to give methods for determining the quantity of activated charcoal required per year of operation and the best type of adsorption system. Some of the basic approaches to the design of activated charcoal purification systems, the conversion factors, and tables of indices are presented here for the first time. Certain of the figures are based on a limited amount of numerical data. It is expected that the methods will be improved and inconsistencies ironed-out as their use increases.

Use of activated charcoal in connection with heating, cooling, and ventilating (Fig. 1) permits one or more of the following results.

1. Increased well-being and efficiency of personnel by removing stuffiness and irritating vapors.
2. Recirculation of all or part of the ventilating air, saving heat in winter and refrigeration in summer.
3. Purification of outside air used for ventilation or pressuring.
4. Ventilation of spaces not conveniently connected to central ventilating, heating, or cooling systems, *i.e.*, toilets.
5. Use of one circulating system for all rooms no matter what odors are released in the individual areas.
6. Elimination of odors from air exhausted to the atmosphere.
7. Recovery of values from vapors present in the space.
8. Increased safety by removing combustible or toxic vapors.
9. Elimination of toxic gases resulting from military or industrial emergencies.

SUMMARY — Activated charcoal removes gases and vapors from air by adsorption. When used with heating, cooling, dust filtration, and humidity control, it permits the complete conditioning of air. Methods are presented for determining the load of contaminants to be removed and for the selection and sizing of suitable equipment. The quantity of activated charcoal required to purify air can be predicted directly from the odor removal requirements, independent of the amount of air circulated. The methods presented are based on knowledge of vapors released, analysis of air, type of occupancy, survey by smell, and experience.

Activated charcoal increases air purity in two ways:

1. Removing impurities by adsorption;
2. Permitting recirculation of air — outside air is not brought in and therefore atmospheric impurities are left outside.

In recirculation systems, air is blown through a bed of activated charcoal or past surfaces of activated charcoal. If there is a high rate of air-turnover for uniformity or heat transfer purposes and a relatively low rate of odor release, only part of the air need pass through an activated charcoal bed or the entire flow can go through a partial by-pass type of filter and obtain the advantages of low resistance and low first cost.

Outside air is not pure in most industrial and urban locations and may not be suitable for ventilation purposes. In the case of an atmospheric or military emergency, ventilation with unpurified outside air presents exceptional hazards. For purifying outside air, exhaust air, or in recirculation systems with high odor level, the activated charcoal filter should have high purification efficiency for each passage of air.

Nature of Odors

The word *odor* is used herein to denote all of the types of contaminants, irritants, or noxious gases carried by air in vapor form which may be removed by purification with activated charcoal. An odor is a chemical compound or mixture of compounds in vapor form which affects the nose in such a way as to create the sensation of smell. Most of these substances have odors even though the effect on the nose may not be as serious as the irritation to other parts of the body. Even below the concentrations which can be recognized as odors, many of these vapors may cause stuffiness or drowsiness.

It requires only a very small amount (1 ppm, for example) of the vapor of certain chemical compounds in the air to give the sensation of odor. The quantity that is just barely perceptible as odor is called the threshold point. Ordinarily it requires about 10 times that concentration to give a definite sensation of odor, and another 10-fold increase before the odor is considered strong. One of the useful sensory scales for evaluating odor intensities is given in Table 1. This allows numbers to be assigned to odor intensities and makes it possible to average the results from odor tests.

Table 1 — Sensory odor intensity scale

Degree of Odor Intensity	Description
0	Odorless
1	Threshold
2	Definite
3	Strong
4	Overpowering

Many gases and vapors are poisonous and there is a limit to the concentrations which the human body can tolerate under long exposure.

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*Vice President, Barnebey-Cheney Co.

For presentation at the Semi-Annual Meeting of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, Minneapolis, Minn., June 1958.

Tables of maximum allowable concentrations are found in THE GUIDE 1957 (Table 3, p. 158) and other ventilating manuals.

Nature of Activated Charcoal

Activated charcoal has an internal sub-microscopic sponge structure consisting of tiny capillary passages, not greatly larger than the size of the molecules that are adsorbed. This is created in the manufacture of the adsorbent by burning out part of the carbon substance to form the internal surface. The terms *Activated Charcoal* and *Activated Carbon* have almost the same meaning and for most purposes can be considered synonymous.

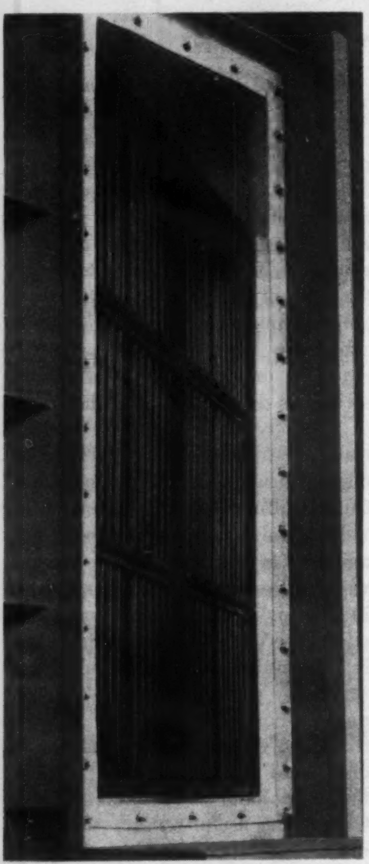


Fig. 1 — Bank of activated charcoal filters

Activated charcoal removes gases and vapors by adsorption. It does not remove ordinary particulate matter such as dust or pollen, but takes up particles so fine that they act in almost the same manner as a gas or vapor. A typical purification system employs mechanical filters or electrostatic precipitators to remove dust and other particulate matter and activated charcoal to remove unwanted gases and vapors.

The adsorptive capacity of activated charcoal for odors in most applications is proportional to the evaluation obtained using an accelerated test with a pure chemical substance approximating the properties of typical odors and in which the charcoal bed is operated to the break-through point. Such a test was also found to be a good measure for gas mask charcoals and has been used by the U. S. Government for many years. This is known as the Accelerated Chloropicrin Test. An activated coconut shell charcoal having a value of 50 min by this test has been widely used in air purification. More activated charcoal of lower activity is required to do a given job and conversely a smaller amount of higher activity carbon is needed. For example, to do the work of 50-minute charcoal, there would be required at least a 25 percent greater quantity of 40-min charcoal.

Activated coconut shell charcoal (Fig. 2) has its adsorptive area in the form of very fine capillary pores which can remove and retain all types of vapor impurities even though they are present in very dilute form. Certain other types of activated carbon (such as prepared from coal or wood) have much larger pores and do not have the power of removing the lower molecular weight materials from dilute concentrations. As a specific example of this, tests have shown that of all commercial activated carbons available, coconut shell charcoal does the best job in critical odor control problems and in apple storages.

One pound of activated coconut shell charcoal has the capacity to remove from air all of the odor that a person would breathe in a normal lifetime. However, in purifying air for a living or working space, it is necessary to purify a great deal more air than is actually breathed by the occupants, perhaps 100 times more because the person has to have space to move about.

Quantity of Activated Charcoal Required

There are 3 main steps in applying activated charcoal to the control of odors in a specific application.

1. Determination of the amount and type of odor in terms of pounds of activated charcoal required per year.
2. Analysis of the cost of activated charcoal purification and the benefits to be received.
3. Settling the details of the application including air circulation rate, activated charcoal filter type, distribution of air flow, and installation details.

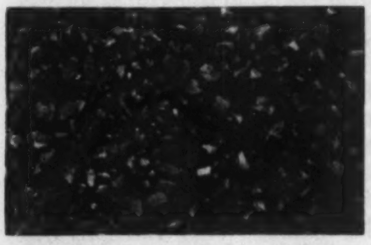


Fig. 2 — Activated coconut shell charcoal

The amount of activated charcoal needed to purify a given space depends on the types of contaminants, the amount to be removed (this depends on the concentration, the proportion of the time that the concentration is present, the uniformity of vapors in the space, and related factors), and the type of activated charcoal used. Each odor control situation requires a certain activated charcoal adsorption capacity per year to satisfactorily do the job. The required quantity of adsorbent can be supplied in the form of permanent-type-factory-reactivated cells, or the disposable type. The air might pass through a small-area thick charcoal filter or a larger area having a thin carbon bed. The amount of activated charcoal required per year might be supplied, for example, in the form of a filter containing twice the yearly requirement which is reactivated every second year, or in throw-away filters having a six month's life and containing half the yearly requirement.

In designing an adsorption system, the calculation of the amount of charcoal should be based on removing 100 percent of the odor. It takes a 90 percent removal to reduce the concentration from the category of *definite* to *threshold* and a 99 percent reduction to go from *strong* to *threshold*. After making an effective or noticeable odor reduction, it takes very little additional activated charcoal to remove the remaining odor.

Table 2 — Capacity of 50-min activated coconut shell charcoal for vapors (condensed, see Appendix[a] for full table)

2 — Acetaldehyde
4 — Acetic Acid
3 — Acetone
3 — Acrolein
4 — Alcohol
2 — Amines
2 — Ammonia
3 — Animal Odors
3 — Anesthetics
4 — Benzene
4 — Body Odors
2 — Butane
4 — Butyl Alcohol
4 — Butyric Acid
4 — Cancer Odor
4 — Caprylic Acid
1 — Carbon Dioxide
1 — Carbon Monoxide
4 — Carbon Tetrachloride
3 — Chlorine
4 — Chloropicrin
4 — Cigarette Smoke
4 — Cresol
3 — Diesel Fumes
4 — Disinfectants
4 — Ethyl Acetate
1 — Ethylene
4 — Essential Oils
2 — Formaldehyde
4 — Gasoline
4 — Hospital Odors
4 — Household Smells
3 — Hydrogen Sulfide
4 — Isopropyl Alcohol
4 — Masking Agents
4 — Mercaptans
4 — Ozone
4 — Perfumes, cosmetics
4 — Perspiration
4 — Phenol
2 — Propane
4 — Pyridine
4 — Ripening Fruits
4 — Smog
3 — Solvents
4 — Stuffiness
4 — Toluene
4 — Turpentine

The capacity index has the following meaning:
4 — High capacity for all materials in this category. One pound takes up about 20 percent to 50 percent of its own weight — average about 1/3 (33-1/3%). This category includes most of the odor-causing substances.
3 — Satisfactory capacity for all items in this category. These constitute good applications but the capacity is not as high as for Category 4. Adsorbs about 10 to 25 percent of its weight — average about 1/6 (16.7%).
2 — Includes substances which are not highly adsorbed but which might be taken up sufficiently to give good service under the particular conditions of operation. These require individual checking.
1 — Adsorption capacity is low for these materials. Activated charcoal cannot be satisfactorily used to remove them under ordinary circumstances.

[a] It is planned to publish the Appendix with the paper in TRANSACTIONS 1958.

The most difficult problem in applying any type of air purification is a determination of the quantity and type of contaminants that must be removed. With this information at hand the quantity of activated charcoal can be determined easily. Often a shortcut can be taken which combines the two into one step. Listed here are 7 methods. One or more of these is applicable to every situation. It is best to figure the amount of charcoal required by several methods if applicable and compare the results.

A. Knowledge or analytical determination of specific odor-causing compounds and their amounts.
B. Inventory of individual odor sources.
C. Type of occupancy and volume to be purified.
D. Dilution by purified air using the tables in THE GUIDE of ASHAE.
E. Purification test using a small adsorber.
F. Survey based on smell.
G. Rules of thumb and experience.

Method A — Knowledge or analytical determination of specific odor-causing compounds and their amounts: This calls for knowledge of the operations going on within the area or an analysis of the contaminants in the air. If the odors are from a manufacturing process or similar operation, it may be possible to establish the types of vapors given off, their concentration, and the quantity which must be removed per year. In other cases this information can be obtained by analytical procedures. A method useful where the odor concentration is rather high involves freezing out the vapors at low temperature and subsequent chemical analysis.

Table 2 gives the relative capacity of 50-min activated coconut shell charcoal for most of the common air contaminants and many others that are found in specific applications. The figures are based on the removal of the substance from dilute concentration in air as is encountered in air recovery and air purification projects.

If the odor under consideration is listed in classification 4, then we can assume that each pound of activated charcoal will take up one-third of a pound of odor. Multiply the weight of odor to be removed by three to determine the quantity of activated charcoal needed to do the job. If the compound is in class 3, multiply the weight of odor by six.

Table 3 — Pounds of 50-min activated coconut shell charcoal required per year[a]

Residences	
Total per person	
Non-smoking	1
Smoking	2
Individual rooms per person	
Living room	0.5
Dining room	0.25
Kitchen	0.25
Toilet and bath	0.25
Bedroom	0.15
Laundry	0.15
Office	
Total per person	
Non-smoking	1
Smoking	2
Hotel, per person, average occupancy	2
School, per pupil	1.5
Hospital (room or ward), per bed	3
Laboratory (average), per person	3
Bar or tavern, per occupant	5

[a] Add up the amount of activated charcoal needed by units as indicated in the table. For example, if there are 6 people in an office, 3 of whom are smokers, and 3 non-smokers, a total of 9 lb for one year's service under average conditions is indicated.

Method B — Inventory of individual odor sources: An odor inventory (directly in terms of activated charcoal required) can be prepared using Table 3 or similar information for the situation under consideration.

Method C — Type of occupancy and volume to be purified: Given in Table 4 are the amounts of space (cubic feet) of some selected types which can be purified by one pound of activated charcoal per year.

Table 4 — Cubic feet of space which can be purified by 1 lb of activated charcoal per year[a]

Chemical processes	— 1/10 to 100
Chemical plants	— 50 to 500
Laboratories	— 50 to 500
Printing plants	— 10 to 500
Toilets	— 100 to 1000
Cold storage	— 100 to 1000
Offices	— 100 to 5000
Public buildings	— 200 to 1000
Homes	— 1000 to 5000

[a] This table is for general guidance only and gives the range in which the stated applications ordinarily fall. Although there is a variation of about 50 to 1 in typical air-conditioning situations, it is less than the difference between threshold and strong odor levels.

In connection with many chemical processes, coating operations, and other locations where large amounts of volatile compounds are given off, it is possible to regenerate the activated charcoal in-place (Fig. 3) by steaming or other suitable treatment. In a typical situation, the activated charcoal might be desorbed and reused 5,000 times in one year which means that one pound could perform the same service as many pounds if in-place regeneration were not used. In the usual type of air-conditioning applications, it is not feasible or necessary to use in-place regeneration.

The relative odor levels in the various types of locations where activated charcoal air purification can be used are listed in Table 5 as A, B, C, or D. Locations A contain the lowest amount of odor and D the highest. B and C represent levels in between. Many of the classifications are rather general so it was necessary to pick a typical average condition. The odor index for a specific situation could vary somewhat from that given in the table if special circumstances apply. In typical cases, one pound of 50-min activated coconut shell charcoal will purify the following cu ft of space for one year: A — 2,000; B — 800; C — 300; and D — 100.

For certain specific types of applications there may be rather accurate experience which dictates the amount of activated charcoal to use and the best method of applying it. For example, in cold storage rooms for apples, it has been shown that 6 lbs of activated coconut shell charcoal and 100 cfm of recirculated air should be used during each storage period for each 1,000 bushels of apples.

Method D — Dilution by purified air using the tables in THE GUIDE *of ASHAE*: This is based on dilution by purified air. Table 1 (p. 113) and Table 3 (p. 297) of THE GUIDE 1957 show the amount of outside air which should be used for ventilation (elimination of odors and stuffiness). Activated charcoal is used to purify an equivalent amount of recirculated air and this is used instead of outside air. A standard practice for ventilating might indicate in a specific case that 30 percent of the recirculated air should be exhausted and replaced with fresh air. If this same amount is purified by activated charcoal rather than replaced, the result will be essentially the same. This means that of the recirculated air stream, 30 percent might be 95 percent purified by activated charcoal and mixed back in with the rest of the stream. This means that the recirculated stream has been purified to an extent of about 30 percent and the total stream is certainly not equivalent to 100 percent fresh air. But if the amount purified by activated charcoal is the same in quantity as the amount of fresh air, that might have been used, the result will be the same. If improved air quality is desired, a greater proportion of the recirculated stream should be purified.

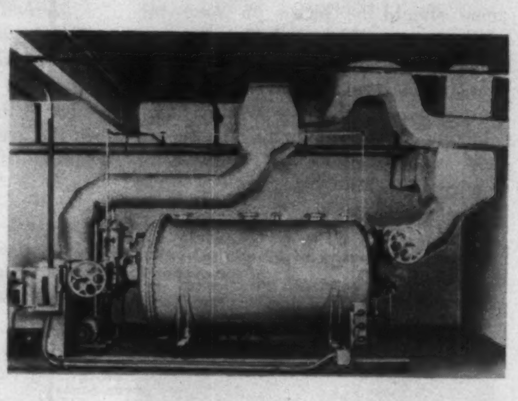


Fig. 3 — Activated charcoal unit with in-place regeneration

Method E — Purification test using a small adsorber: A test can be made with a small activated charcoal purification unit (Fig. 4) to duplicate with a portion of the air or part of the space the type of treatment that can be expected with commercial activated charcoal filters. This test requires only a small amount of equipment and is the simplest approach to complicated odor control problems.

For most industrial and commercial applications, it is suggested that the test be run with a test unit which has an air capacity of 65 cfm and contains 3 lb of activated coconut shell charcoal. This is a ratio of about 45 lb per 1,000 cfm which is that contained in commercial activated charcoal cells. The test unit should be mounted in the area under consideration and operated so that the air being treated by it will represent that to be handled in the commercial installation. By smelling the air discharged from the test unit, it can be determined whether the odors are being satisfactorily removed. The human nose sometimes becomes accustomed to odors after long periods of exposure and it is suggested that the person doing the testing should allow the discharge to blow on his face for a period of some minutes and after this exposure to deodorized air, then smell the surrounding area which has not been so purified. In some cases it may be convenient to isolate a small portion of the space, say 500 to 1,000 cu ft, and purify that part with the small purification unit.

This type of test cannot be done rapidly. The unit should operate for

Table 5 — Odor index for type of space (condensed, complete table in Appendix[a])

C — Aircraft
D — Air raid shelters
D — Animal rooms
A — Apartment buildings
C — Apple storage
B — Auditoriums
C — Bars
C — Beauty shops
A — Churches
C — Conference rooms
B — Department stores
C — Drug stores
D — Funeral homes
A — Homes
C — Hospitals
B — Hotels
C — Kitchens
C — Locker rooms
D — Meat packing plants
C — Morgues
B — Offices
C — Photo dark rooms
D — Pollution control
C — Public toilets
C — Recreation rooms
B — Restaurants
C — Schools
B — Super markets
C — Telephone exchanges
B — Theaters

[a] It is planned to publish the Appendix with the paper in TRANSACTIONS 1958.

a long enough time to definitely show that the activated charcoal will have good life under the existing conditions and that it will not be necessary to reactivate so often that the application is not economically feasible. For example, if odors break through after one month's operation, it indicates that it will be necessary to reactivate the commercial installation after each month. This may be too often and entail too much expense. On the other hand, if the odor level is very heavy and there is much to be gained by completely purifying the air, it still may be worthwhile to do. For heavy duty applications where the test shows short life, the use of filters with thick activated charcoal beds may be indicated. Generally speaking, in most commercial and industrial situations, the adsorber cells have to be reactivated every 6 months to 2 years, depending on odor level. If no odor breaks through the test cell in 6 months, it can be assumed that the commercial equipment will function for at least 6 months without requiring reactivation.

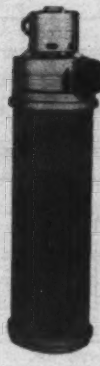


Fig. 4 — Canister circulator unit

It is possible in some cases to accelerate the test. If, for example, the ventilating system normally operates only 8 hr per day and 5 days per week, but the odor is continuously present, then it may be possible to run the test cell 24 hr a day and 7 days per week. That means that one month's operation would be equivalent to 4.2 months of actual service. Also, it may be that the odor is more concentrated in a given area. If the test unit is run at such a location, it can be assumed that the saturation of the test cell will be accelerated. If the odor breaks through in one month, one can say, just as a guess, that this might represent anywhere from 5 months to a year in actual service on air having the average concentration of odors. It is somewhat dangerous to try to make accurate predictions by such a procedure because a slight difference in odor perception represents a tremendous increase in odor concentration.

If the test unit is operated for one or two months under average conditions it may then be possible to determine analytically the degree to which the activated charcoal's capacity has been depleted and give an estimate on the adequacy of charcoal treatment for the purpose.

It is sometimes possible to desorb the odor from the charcoal and determine the main types of chemical compounds involved, that is, whether they are organic compounds or inorganic materials and whether the major constituent is, for example, an alcohol, an ester, or an aldehyde. An exact analysis of the quantities of different individual odor-causing constituents is ordinarily difficult. There are many different chemical compounds which make up the average odor mixture and many of these are changed in composition upon being removed from the charcoal.

Method F — Survey based on smell: Table 6 is a rough correlation between odor intensity, vapor concentration, and space which can be purified by one pound of activated charcoal per year. With approximately 500,000 (more exactly, 525,600) min in a year and at a 5-min air change, there would be 100,000 air changes per year. Assume that activated charcoal refers to 50-min coconut shell charcoal; assume the odor is at the stated level one-third of the time, or 8 hr per day; assume that 1 lb of activated charcoal takes up one-third pound of odor. The odor level required to give a certain physiological reaction is a sort of typical average figure. Odor perception varies from person to person and also depends on temperature, humidity, and air velocity. Some odors are stronger than others and the amount required might be greater or less by a factor of 10 or more.

A 1,000 cubic foot space at the threshold level will require the treatment of 100 million cu ft of air per year at a 5-min change. If there is one-hundredth of a pound of odor per one million cubic feet, this means that 1 lb of odor will be removed per year from this space, providing the stated level persists 100 percent of the time. Since it was assumed that it will persist one-third of the time, this gives 1/3-lb of odor. Also, since we have assumed that 50-min activated charcoal will take up 1/3-lb of odor per lb, 1 lb of activated charcoal will do the job. This manner of calculating is approximate but illustrates the principles involved in odor control.

Method G — Rules of thumb and experience: A person experienced in odor control problems and in the use of activated charcoal can ordinarily make a reasonable selection of equipment based on rather meager information. The more information that is available, the more accurate can be the selection.

It is possible to make a rough determination of odor concentration by smell. An expert in odor control may be able to recommend the type of purification equipment to use based on an examination of the situation using his sense of smell. Whenever possible, this should be checked by one of the other methods.

Table 6 — Correlation between odor intensity, vapor concentration, and space which can be purified by one pound of activated charcoal per year

Degree of Odor	Cu Ft Per Lb of Charcoal per Year	Lb of Odor per Million Cu Ft	Odor Index
Too little to smell	10,000	0.001	0
Threshold (just perceptible)	1,000	0.01	1
Definite	100	0.1	2
Strong	10	1.0	3
Overpowering	1	10	4
Toxic (process only)	1/10	100	5

Wide experience in odor control permits an expert to make recommendations based on knowledge of the performance of successful installations. He knows what type of equipment gave satisfactory results for similar problems (Fig. 5).

Types of Activated Charcoal Purification Systems

The type of activated charcoal filters to use and the amount of air circulation depend on the amount of charcoal required, how the odor is released in the room, the type of occupancy, the arrangement of the ventilation system, and similar factors. The higher the rate of odor release, the faster should be the air turnover and the more activated charcoal is required per year.

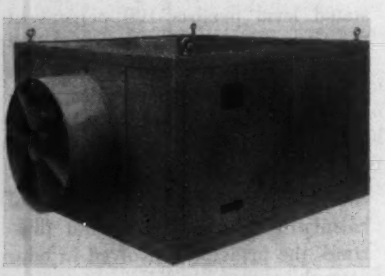


Fig. 5 — Cabinet type purifying unit

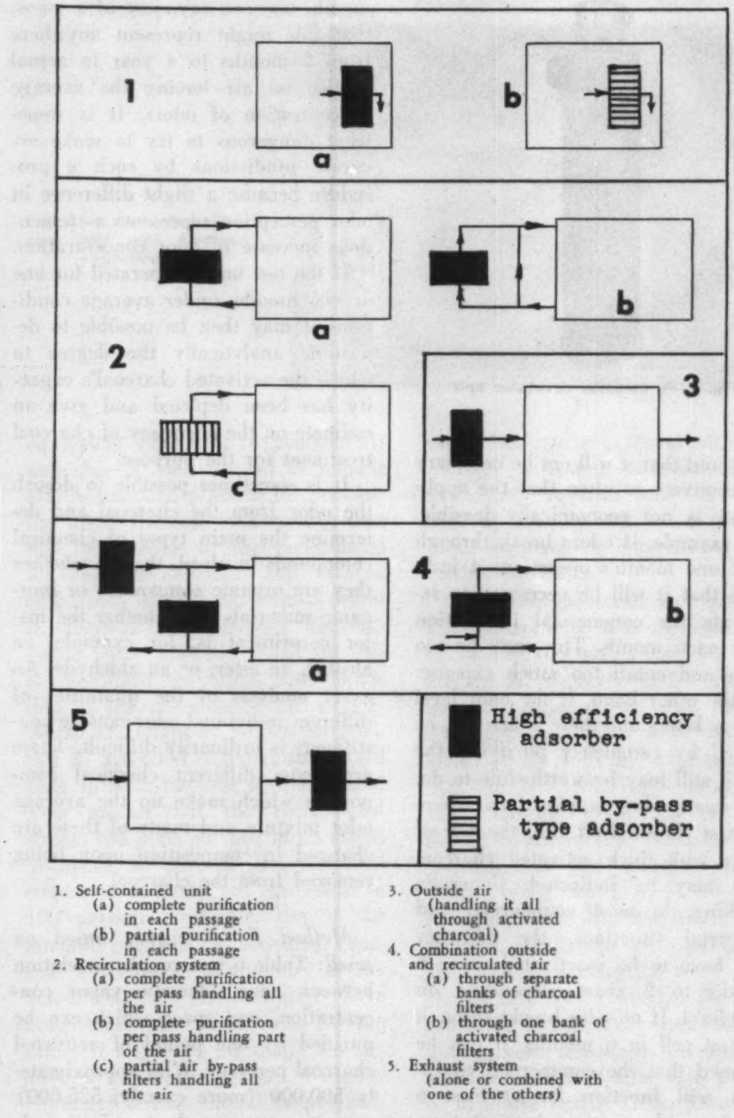
To be effective in any given situation, the odors from the ventilated area must reach the charcoal by means of circulated air so that they can be adsorbed. This is a function of the rate of odor release, size and shape of the room, type of ventilating system, placement of the activated charcoal filters or circulating units, eddy currents caused by open doors, partition walls, and moving machinery, and other related factors. The physiological reaction to odor depends on its concentration, the air velocity, temperature and humidity of the air, and the individual occupants.

Fig. 6 shows diagrammatically the important types of activated charcoal purification methods using self-contained circulating units or ducted systems.

Types 3 and 4 of Fig. 6 should not be used unless outside air is desirable for temperature, humidity, oxygen, or carbon dioxide control. Where there is some doubt about the oxygen sufficiency, bring in a small amount of purified outside air. It is easy to determine the oxygen content in the building under consideration or in a similar building. Such a test employs standard equipment and its use can be learned quickly.

Another approach where regulations or personal opinions have dictated a certain amount of outside air is to design the system so that ventilating air can be brought in from the outside if desired or shut off so that complete recirculation is employed. After the system is in operation, a few tests will demonstrate where complete circulation can be used to advantage.

As indicated in Type 5 of Fig. 6, activated charcoal can be used to advantage to purify air exhausted from kitchens, toilets, process operations, or other areas having high concentrations of contaminants. The air, after purification, can be discharged to the atmosphere without fear of pollution



1. Self-contained unit
   (a) complete purification in each passage
   (b) partial purification in each passage
2. Recirculation system
   (a) complete purification per pass handling all the air
   (b) complete purification per pass handling part of the air
   (c) partial air by-pass filters handling all the air
3. Outside air (handling it all through activated charcoal)
4. Combination outside and recirculated air
   (a) through separate banks of charcoal filters
   (b) through one bank of activated charcoal filters
5. Exhaust system (alone or combined with one of the others)

Fig. 6 — Systems of applying activated charcoal

or can, in many cases, be reused in the ventilation of the building. Where the concentrations are high, thicker beds of activated charcoal should be used or in some cases the cells can be regenerated in-place. It is sometimes possible to recover useable and valuable material from exhaust air (Fig. 7).

Purification of all of the recirculated air by activated charcoal is the most fool-proof way in many cases. There is little that can go wrong with such a system and it will operate effectively even though there are periodic overloads of odor. This may, however, be more expensive in the initial installation than a smaller but adequate system. An oversize system does not cost any more as far as operation is concerned. If extra activated charcoal is put in initially, it means that the cells will not have to be reactivated as often.

If there is doubt about the amount of odor to be removed or the rate of air change which should be employed, it is feasible to install a minimum bank of adsorbers and provide in the building plan for the addition of more adsorbers if they should be needed.

In cases of high odor concentration, it may be feasible to lighten the load on the activated charcoal adsorbers by using some type of pretreatment. The adsorbers should usually be protected with dust filters to prevent them from becoming mechanically loaded with particulate matter which interferes with the air flow. In the case of ammonia (for which activated charcoal has limited capacity), scrubbing with water either before or after the activated charcoal cells may be desirable. In the case of kitchen exhaust, adequate grease filters should be used ahead of the adsorbers. With heavy concentrations of smoke (which does not perform like a true vapor), it may be advantageous to use electrostatic precipitators ahead of the carbon filters.

Let us consider a charcoal filter having a ½ in. thickness of 6 × 10 mesh, 50-min activated coconut shell charcoal and sufficient in area so that the face velocity is about 40 fpm. The air after passing through such a filter is generally odor-free and the equivalent of fresh air. Manufacturers rate the efficiencies of such adsorbers at approximately 95 percent. The efficiency might be higher than this, say 97 or 98, when the cell is first installed and may drop to about 90 just before the cell is reactivated or the activated charcoal changed. In most of the ventilating problems a 95 percent removal efficiency is sufficient to bring the odor level well below threshold and produce fresh air. Such a filter has a pressure drop of 0.2 in. of water.

Fig. 7 — Activated charcoal installation for recovery of values in gases

An activated charcoal bed 1 in. thick rather than ½ in. thick might have an average efficiency during its useful life of about 98 percent. It might start out at 99 percent and drop to as low as 90 percent just before the charcoal is changed. Such a cell has a pressure drop of 0.30 to 0.35 in. of water at standard velocities.

Everything else being equal, the service life (not initial efficiency) and resistance are proportional to the thickness of the activated charcoal bed. Commercial adsorber cells of the straight-through-factory-reactivated type are available with charcoal bed thicknesses from ½ to 4 in. and the efficiencies, depending on conditions of operation, can vary from 90 to practically 100 percent. If the cells are reactivated frequently the adsorption efficiency can be maintained at a high level. Deep carbon beds (frequently regenerated in-place) are used for very high concentrations such as are found in process applications. The partial by-pass types have efficiencies in the general range of 5 to 50 percent and the resistance to air flow are generally lower than the other types.

Table 7 — Correlation between odor concentration and type of equipment

Odor Index	Pounds of Odor per Million Cu Ft	Cubic Feet of Space per lb Of Charcoal per Year	Activated Charcoal Equipment Type: Disposable Filters	Factory Reactivated Filters	In-place Reactivated Units
0	0.001	10,000	X		
1	0.01	1,000	X	X	
2	0.1	100	X	X	
3	1.0	10		X	X
4	10	1			X
5	100	1/10			X

To purify 30 percent of the recirculated stream through a ½ in. thick charcoal filter of the type just described means that 30 percent of the air must be boosted to an additional pressure of 0.2 in. of water by a fan or the total air stream must be increased in pressure by this amount and 70 percent throttled through by-pass valves. Another way to solve the same problem at lower pressure drop is to use a partial by-pass type of filter having an efficiency of 30 percent and this might be done with a pressure drop of about 0.1 in. of water rather than 0.2 in.

A common error in building ventilation stems from a wrong assumption in the basic facts that apply to the problem, particularly with regard to the amount and type of odor to be removed. The usual result is an inaccurate prediction of how often the purification cells must be reactivated. Suppose, for example, a building has a volume of 300,000 cu ft. One engineer might decide that the air should be changed every 15 min. This would mean a circulation of 20,000 cfm or would require 20 — 1,000 cfm adsorbers if all the recirculated air is purified. Another engineer might decide that for odor control or temperature control reasons, the rate of air change should be every 3 min. This would call for 100,000 cfm, or 100 — 1,000 cfm cells. The purification problem has not changed but there is a five-fold increase in the equipment required. The latter system with only 20 percent of the air passing through 20 cells might be equal to the first in odor control performance.

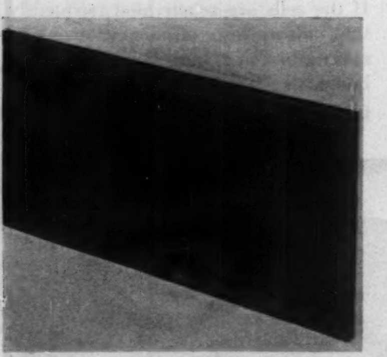


Fig. 8 — Disposable activated charcoal filter

Table 7 gives a rough correlation between the odor concentration and the type of equipment recommended. As an example of the use of Table 7, consider a space of 40,000 cu ft with an odor index of 2, which means that there is a definite (but not strong) odor present. The table shows that one pound of activated charcoal per year is required for each 100 cu ft of space purified, or in this case, 400 lb.

By using standard commercial adsorbers (Figs. 8 and 9) which contain 45 lb of 50-min. activated coconut shell charcoal there would be needed the equivalent of 9 cells per year. By using 9 cells in parallel (9,000 cfm recirculation) the bank would be reactivated once each year. This would give an air change every 4½ min. If it is decided that a less rapid air change is satisfactory, say every 10 minutes, this would mean a circulation of 4,000 cfm and a bank of 4 cells can be used in parallel. To give the same purifying capacity would require that the bank be reactivated approximately once every 5 months.

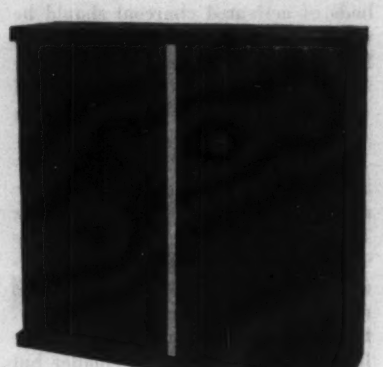


Fig. 9 — 1,000 cfm adsorber contains 45 pounds of activated charcoal

In general, use the amount of activated charcoal required in the form of adsorber cells which best fit in with the ventilating, heating, or cooling system with regard to size, air velocity, and pressure drop. Complete detailed information can be obtained from the manufacturer's literature or by submitting the problem to specialists in activated charcoal air purification.

SHAWHAN HEADS BRYANT

The new president of Bryant Manufacturing Co., Indianapolis, Ind., a division of Carrier Corporation, is S. F. Shawhan, a member of the Society since 1945. For a number of years, he was active in connection with the Unitary Equipment Division of Carrier. He is a member of *ASRE* and has also been active in connection with various programs of *ARI*.

F. F. DODDS RETIRES

On the occasion of his retirement from active duties with American Radiator and Standard Sanitary Corporation at Kansas City, Mo., F. F. Dodds was given a surprise dinner party by many business associates. His retirement ends a 45-year period of service to the firm.

He was district sales manager at the Kansas City office of the corporation and thus had supervision of operations in some 17 states. Mr. Dodds has been actively connected with many local city groups in Kansas City including the Rotary Club and Chamber of Commerce. He has also served in connection with the activities of numerous hospital and medical groups there. He became a member of the Society in 1920 and was made a Life Member in 1952.

HEAT TRANSFER

Volume II of the well-known standard reference book entitled *Heat Transfer*, by Max Jakob, deals mainly with certain selected fields of heat transfer applications. It presents a comprehensive analysis and discussion of heat radiation in spaces of simple configuration. Presentation of the subject matter is thorough and its treatment is critical. A special feature is the inclusion of a section entitled *Supplements to Volume I* which serves to bring up to date some of the material in Volume I and which needs additions or modifications because of developments which have taken place since the appearance of the original volume in 1949 (John Wiley & Sons, Inc., New York, Price $15.00).

MATZKIN MADE CONTRACT ADMINISTRATOR

S. I. Matzkin, associate member of the Society, has joined Consolidated Diesel Electric Corp. as contract administrator in Los Angeles, Calif.

Previously, Mr. Matzkin was mechanical engineer with Leowy-Hydropress Division of Baldwin-Lima-Hamilton Corp. He was also active in connection with various missile projects of the Armed Forces.

Marine Application of High-Temperature Water

By

S. W. Brown

The author is Consulting Engineer, Chrysler Building, New York, N. Y. A presentation at the Symposium on High-Temperature Water at the 64th Annual Meeting of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, Pittsburgh, Pa., January 28, 1958.

APPLICATION of *high-temperature water* for shipboard is virtually non-existent. Investigations both here and abroad reveal that high-temperature water has never been applied on ships, unless systems designed for 240 F are included in this category. A number of passenger vessels, such as the *Lurline*, have installed 240 F hot water circulating systems for serving the terminal reheat coils. The author's study reveals interesting possibilities for high-temperature water for heating, hotel, and consumer purposes on passenger liners, cargo ships, tankers and naval craft.

By *high-temperature water* is meant, temperatures in excess of 240 F. Land-based heating plants in this country have been designed for circulating water at temperatures of 320 to 420 F at pressures of approximately 120 to 300 psig. Its use, so far, has been principally for large scale district heating systems and industrial applications. In Europe, it even has been applied up to the critical temperature of 706 F. Heat carriers other than water have been found to be more suitable for temperatures above 420 F in order to avoid excessively high pressures.

High-temperature water systems are similar in many respects to ordinary hot water systems. Because of the characteristics of water under high pressures and at temperatures close to the saturation temperature, special design features are required. Those who advocate high-temperature water contend that high-temperature water has the advantages of high-temperature steam coupled with the simplicity of a hot water system, without the complexities and thermal losses of a steam system.

History and Development of High-Temperature Water Heating

High-temperature water was first investigated by the German technician Klingelhoefer around the turn of the century. The result of his work led to the development and application of high-temperature water to the bakelite and other process industries, as well as to district heating systems in Germany. High fuel costs on the European continent and in Great Britain have stimulated its use in combination with power generation.

During later years, many industrial heating plants were converted from steam to high-temperature water. Today, thousands are in operation in Europe. There are now more than 300 in this country.

Because of its favorable properties, high-temperature water is firmly established on land as a preferred heating medium and considered superior to steam for many applications.

Proposed Design of a High-Temperature Water System

There are various methods of applying high-temperature water on shipboard. All systems are closed circuit, having a heat producer with one or more circulating pumps to circulate the water to heat consumers through a system of supply and return distribution piping. Expansion of high-temperature water is provided by oversizing the shell of a heat exchanger to allow for steam space, or through the use of a separate expansion drum.

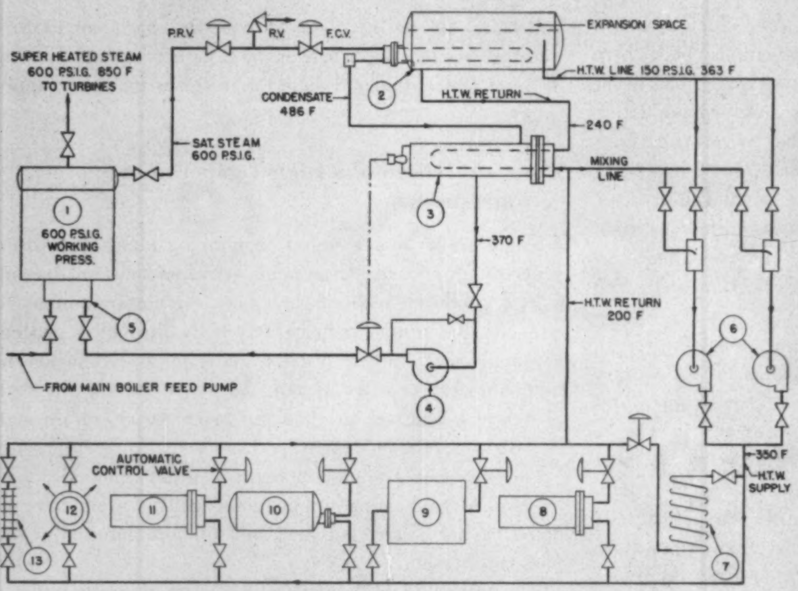
On shipboard, high-temperature water generally can be applied to heating applications, galley, production of domestic hot water, laundry, fuel oil and lubricating oil tank coil heating.

The source of high-temperature water depends entirely upon the type of heat cycle arrangement and the location of heat extraction for heating purposes. To illustrate this, several typical arrangements are shown. Each shows a typical scheme for the generation of high-temperature water in a closed circuit.

In Fig. 1, a conventional boiler is shown where the saturated steam for the various services is taken off the steam drum prior to its entering the superheater. It then passes through a pressure-reducing valve, a flow control valve, and finally through the tubes of a heat exchanger constituting the high-temperature water generator. Or, instead of saturated steam, superheated steam is passed through a pressure reducing valve, flow control valve, and to the high-temperature water generator. Whichever process is used, the steam will condense in the high-temperature water generator. The condensate is passed through the shell side of the condensate cooler. There, it is cooled and returned through the boiler feed pump to the steam boiler. Both the high-temperature water generator and the condensate cooler are shell and tube type heat exchangers.

A liquid level controller located in the condensate cooler shell regulates the amount of water pumped to the boiler so that the boiler feed pump is at all times kept under adequate positive suction head.

A by-pass from the boiler feed pump discharge to its suction side maintains a minimum flow in the event the liquid level control valve is closed. The high-temperature water at a pressure of 150 psig and an approximate temperature of 363 F is drawn off the shell side of the high-temperature water generator and is mixed with a small portion of relatively cool (200 F) return water ahead of the pump suction in order to avoid flashing of the high-temperature water into steam at the suction eye of the pump and to attain temperature control of the water leaving the pump. The circulating pumps supply the circuit with 350 F water. Return water temperature is assumed to average 200 F. A temperature or pressure control valve responding to the conditions in the exchanger, regulates the steam admission to the high-temperature water generator. Pumps used are frequently single stage centrifugal with water cooled bearings and packing glands. This type of pump usually has a flat characteristic curve over a wide range of flow so that the system pressure does not fluctuate greatly with changes in flow rates.



MARK	DESCRIPTION
1	BOILER
2	HIGH-TEMPERATURE WATER GENERATOR
3	CONDENSATE COOLER
4	BOILER FEED PUMP
5	ECONOMIZER
6	HOT WATER CIRCULATING PUMPS
7	OIL TANK PREHEATER
8	OIL HEATER
9	AIR HEATING COIL
10	DOMESTIC HOT WATER GENERATOR
11	CONVERTER, — SPACE HEATING
12	UNIT HEATER
13	CONVECTOR

Fig. 1 — Proposed generation and application of high-temperature water from a conventional marine boiler

Fig. 2 shows a system using steam extracted from steam turbines to produce high-temperature water. By utilizing extraction steam for heating purposes, it is possible to reduce the fuel consumption for production of power and heat aboard ship.

It is interesting to follow this simplified circuit from the boiler to a turbine unit having 3 stages of extraction. Assuming the first stage to be 50 psig, the steam is bled into the tube side of the shell and tube type high-temperature water generator. Again, the steam condenses in the exchanger and the condensate is then passed through the shell side of the condensate cooler. There the condensate is cooled further to extract additional heat and is then returned, through the boiler feed pump, to the steam boiler.

The high-temperature water, at a pressure of 43 psig and 290 F is taken from the shell of the HTW generator and flows to the suction side of the circulating pump. It is mixed with a small portion of return water to produce approximately 285 F supply water and 200 F return water.

Because the high-temperature water transfers heat at a considerably lower mean temperature than steam at the same turbine exhaust pressure, the power produced by extraction turbines using secondary high-temperature water heat distribution is increased. Accordingly, more of the power-producing potential of the steam is utilized. This is clearly demonstrated by developing a temperature-entropy diagram for a steam-process-heat-power cycle. For a turbine exhaust pressure of 50 psig the corresponding steam condensation temperature is 298 F. Employing this steam to produce high-temperature water, the supply temperature would be about 285 F assuming a 14 deg temperature approach between the steam and water to effect heat transfer. The high-temperature return temperature will again be assumed at 200 F as before so that the mean water temperature will be 242.5 F. If the steam is used directly, condensation would take place at the constant temperature of 298 F and at the constant pressure of 50 psig. All energy below 298 F would be rejected while for high-temperature water, only the energy below 242.5 F becomes unavailable. Thus the temperature range is increased by 55.5 deg, therefore, more heat is available for useful purposes with high-temperature water. Also, the saturation pressure, corresponding to a temperature of 242.5 F is approximately 11 psig instead of 50 psig. Consequently, the available pressure gradient is extended beyond 50 psig.

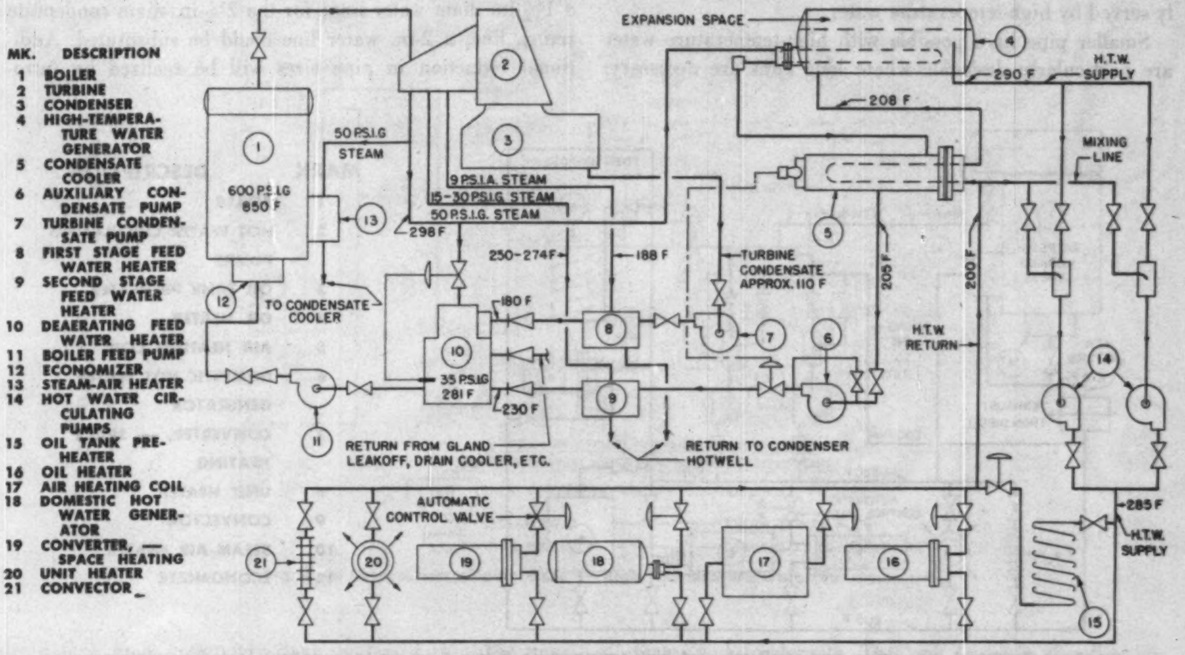

MK. DESCRIPTION
1 BOILER
2 TURBINE
3 CONDENSER
4 HIGH-TEMPERATURE WATER GENERATOR
5 CONDENSATE COOLER
6 AUXILIARY CONDENSATE PUMP
7 TURBINE CONDENSATE PUMP
8 FIRST STAGE FEED WATER HEATER
9 SECOND STAGE FEED WATER HEATER
10 DEAERATING FEED WATER HEATER
11 BOILER FEED PUMP
12 ECONOMIZER
13 STEAM-AIR HEATER
14 HOT WATER CIRCULATING PUMPS
15 OIL TANK PREHEATER
16 OIL HEATER
17 AIR HEATING COIL
18 DOMESTIC HOT WATER GENERATOR
19 CONVERTER, — SPACE HEATING
20 UNIT HEATER
21 CONVECTOR
EXPANSION SPACE
600 PSIG
850 F
50 PSIG
STEAM
9 PSIA STEAM
15–30 PSIG STEAM
50 PSIG STEAM
298 F
250–274 F
188 F
290 F
208 F
H.T.W. SUPPLY
MIXING LINE
TURBINE CONDENSATE APPROX. 110 F
205 F
200 F
H.T.W. RETURN
TO CONDENSATE COOLER
180 F
35 PSIG
281 F
230 F
RETURN FROM GLAND LEAKOFF, DRAIN COOLER, ETC.
RETURN TO CONDENSER HOTWELL
AUTOMATIC CONTROL VALVE
285 F
H.T.W. SUPPLY

Fig. 2 — Proposed generation and application of high-temperature water from marine steam turbine cycle

From a theoretical and practical standpoint, the ability to control the uniform transfer of heat from high-temperature water is both possible and advantageous. The film coefficient for condensing steam cannot be easily or repetitively predicted by the designer. It will vary widely according to the type of condensation, whether dropwise or filmwise; according to the condition of the steam whether superheated, saturated or wet; and according to the physical aspects of the surface on which the steam condenses, whether vertical, horizontal or inclined, inside of tubes or outside of them.

Coefficients of heat transfer for high-temperature water are a function of the water velocity, and can, therefore, be closely calculated, predicted and realized. Accordingly, any application of heat transfer requiring relatively close control of temperature, can be more effectively realized by employing high-temperature water rather than steam.

Applications

Occasionally, as on the passenger ship *S. S. Atlantic*, now being converted for the American Banner Lines, a low-pressure steam generator provides the steam required by the hotel services for a passenger ship (this liner for 900 passengers will require approximately 10 million Btu per hour to meet its heating service during winter operation). The low pressure steam is generated in a shell and tube heat exchanger by exchanging heat with steam bled directly off the main boiler or in a separate low pressure boiler.

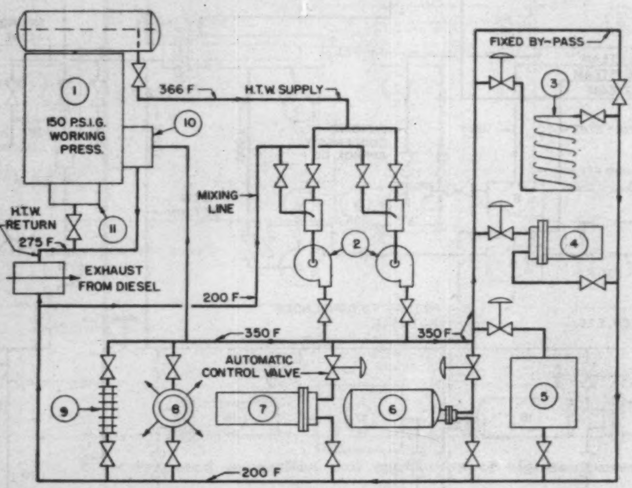
In diesel ships, high-temperature water may be generated directly in a separate boiler. This can be done either by an independently-fired, compact forced-circulation boiler or by a scotch marine-type boiler. The former would utilize an external expansion tank as shown in Fig. 3, the latter its own steam drum to permit expansion of the high-temperature water and to separate the steam from the high-temperature water. Return water should be maintained at temperatures above 275 F if oil firing is used to avoid serious corrosion.

Note that the circuit in Fig. 3 is similar to those previously discussed. A single circulation pump circulates the high-temperature water through the heat consumers and through the boiler. A mixture of approximately 95 percent water and 5 percent steam enters the expansion drum from the boiler. A pipe extending close to the water surface in the drum draws the hottest water and routes it to the circulation pump. Prior to entering the pump suction, the high-temperature water is mixed with cooler return water to prevent vaporization at the pump inlet eye. A fixed by-pass as shown permits a small quantity of water to be circulated through the distribution pipes in order to keep the pipes hot and to permit operation of the circulating pump when none of the heat consumers demand heat.

It is also possible to produce high-temperature water by exchanging the heat from the exhaust gas from the diesel engines.

Vessels carrying heated liquid cargo which must be maintained within a close temperature range could be served by the high-temperature water system. Also, tankers transporting crude oils requiring heating, can be efficiently served by high-temperature water.

Smaller pipe lines possible with high-temperature water are particularly desirable where long runs are necessary. For example, on a tanker heating lines are run exposed above deck from the engine room located aft to the midshiphouse and the entire length of the ship to the forward location of the main structure.



MARK	DESCRIPTION
1	BOILER
2	HOT WATER CIRCULATING PUMPS
3	OIL TANK PREHEATER
4	OIL HEATER
5	AIR HEATING COIL
6	DOMESTIC HOT WATER GENERATOR
7	CONVERTER, — SPACE HEATING
8	UNIT HEATER
9	CONVECTOR
10	STEAM-AIR HEATER
11	ECONOMIZER

Fig. 3 — Proposed generation and application of high-temperature water from an independent forced circulation boiler

Savings in Initial Cost

The most desirable generation of high-temperature water is in conjunction with power production utilizing a steam extraction point on the turbine for the production of the high-temperature water. This permits more efficient use of the initial steam supply and a saving in fuel consumption.

Significant savings in weight and space, and interesting possibilities of reducing the initial cost as well as the operating cost by high-temperature water are indicated. To illustrate, Fig. 4 shows a schematic of heat consumers for a typical fan room located on the main deck of an existing ship. The illustration shows typical heat users such as preheaters and hot water heaters with heating supply and return lines to and from the various pieces of equipment. A comparison of actual steam pipe sizes *vs* high-temperature water sizes required for identical heat loads is indicated. The number contained in the shaded upper half of each circle designates the diameter of the steam pipe while the lower, unshaded half of the bottom shows the pipe diameter of the corresponding high-temperature water line. Typical cases show that the steam risers 5 in. and 3 in. in diam could be replaced by a 2½-in. diam high-temperature water line; the 3½-in. steam supply line to the fan room could be replaced by a 1½-in. diam water line; for the 2½-in. diam condensate return line, a 2-in. water line could be substituted. Additional reduction in pipe sizes will be realized by introducing high-temperature water coils in the heat consumers such as preheaters and hot water heaters. A reduction in line size, in addition to the obvious savings in piping, flange and valve material and installation costs, results in less heat loss due to radiation to the cooler surrounding space. It reduces the insulation requirements. It provides greater flexibility in the arrangement of the piping and the ability to accommodate heating lines in tight spaces not otherwise possible with steam. Furthermore, steam accessories such as steam traps and drips are eliminated.

Savings in Fuel

Land-based high-temperature water systems which have replaced existing steam systems have generally reported substantial savings in fuel consumption ranging from 15 to 25 percent. These savings are possible, because of losses which are inherent to a greater or lesser degree in all steam systems, and which are eliminated in high-temperature water systems.

Consider the flash-out losses of steam systems. Fig. 5 shows a Mollier diagram of water and steam. Two pressure lines, one labeled 150 psig, the other atmosphere, are indicated. Suppose that steam at 150 psig in a supply pipe is going to a heater, condense the steam in the heater and then trap the condensate. The saturated steam enters the heaters with a total heat content of 1195.6 Btu per lb; in condensing it loses its latent heat of vaporization equalling 857.1 Btu per lb.

In flashing the trap to atmospheric pressure by discharging into a vented condensate receiver or atmospheric drain tank as is commonly done on board ship, the mixture of condensate and steam fully retains its enthalpy of 338.5 Btu per lb, but if the *flash vapor* is not used, 158.5 Btu per lb of this mixture is wasted and only 180 Btu per lb will be returnable to the boiler. This is one source of substantial loss inherent in steam systems. In order to produce 857 Btu of latent heat per lb of steam, the boiler would have to supply 1195.6 — 180 Btu per lb, or 1015.6 Btu, a 16 percent loss prevailing if the condensate is flashed.

Similarly examine the extent of the loss if the condensate and flashed steam is wasted instead of being returned to the boiler, and replaced by 90 F makeup. In this case, in order to produce 857 Btu of latent heat per lb, the boiler would have to supply 1195.6 — 58 Btu per lb or 1138 Btu, a loss of 32.7 percent of the latent heat supplied to the consumer.

As a further example, analyze a typical steam heating system for a passenger liner operating at 35 psig (50 psia) steam. The saturated steam enters the consumer with a total heat content of 1174.1 Btu per lb. In condensing, it loses its latent heat of vaporization equaling 924 Btu per lb. This leaves 250.1 Btu per lb in the saturated liquid. If this liquid is flashed in the atmospheric drain tank 250.1 less 180 Btu per lb, or 70.1 Btu are lost per pound of steam supplied. Thus, of the total amount supplied 70.1 divided by 1174.1, or 5.96 percent are lost in this process.

Another common loss occurring in steam systems is the distribution loss. Distribution losses are generally defined as the difference between plant output and the amount of steam delivered to the consumers. These losses include heat losses from the distribution piping, and all leakage of steam, and condensate. The heat losses in the distribution piping include heat loss through steam pipe insulation; heat loss from uninsulated parts, such as flanges, valves, traps, piping and parts of expansion joints, and steam leaks.

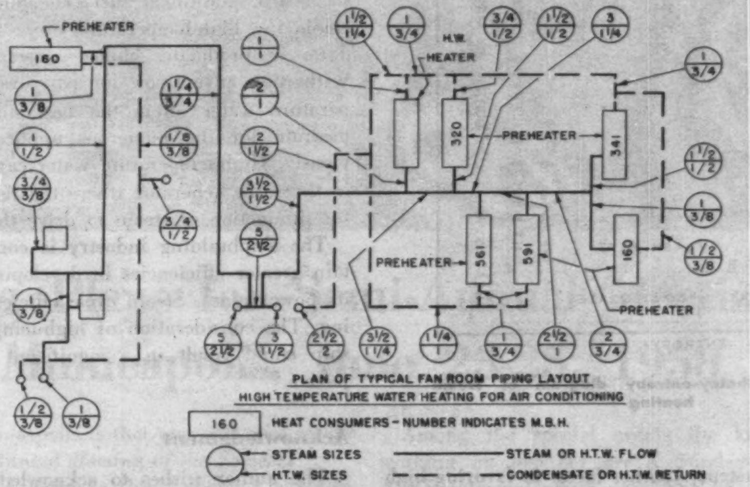

PREHEATER
160
1 / 3/8
1 / 1/2
3/4 / 3/8
1 / 3/8
1/2 / 3/8
1 / 3/8
1 1/4 / 3/4
1/8 / 3/8
3/4 / 1/2
1 / 1
2 / 1
2 / 1 1/2
3 1/2 / 1 1/2
5 / 2 1/2
1 1/2 / 1 1/4
1 / 3/4
H.W.
HEATER
3/4 / 1/2
1 1/2 / 1/2
3 / 1 1/4
1 / 3/4
320
PREHEATER
341
1 1/2 / 1/2
1 / 3/8
1/2 / 3/8
PREHEATER
561
591
160
PREHEATER
5 / 2 1/2
3 / 1 1/2
2 1/2 / 2
3 1/2 / 1 1/4
1 1/4 / 1
1 / 3/4
2 1/2 / 1
2 / 3/4
PLAN OF TYPICAL FAN ROOM PIPING LAYOUT
HIGH TEMPERATURE WATER HEATING FOR AIR CONDITIONING
160
HEAT CONSUMERS - NUMBER INDICATES M.B.H.
STEAM SIZES
H.T.W. SIZES
STEAM OR H.T.W. FLOW
CONDENSATE OR H.T.W. RETURN

Fig. 4 — Comparison of pipe sizes — high-temperature water vs. steam

Failure to return all condensate is particularly wasteful and expensive on a ship where all make-up water has to be prepared in the distilling plant or carried aboard in the fresh water tanks. A saving in make-up water could influence a reduction in size of the distilling unit, and simplify and reduce the operation of the treatment of feed water.

The losses in high-temperature water systems applied to shipboard usage include only pumping losses and insulation losses. The closed circuit, as employed by high-temperature water systems, eliminates losses which cannot be wholly eliminated in steam systems. This results in greater economy for high-temperature water systems.

Maintenance and Operation

Since the system is filled initially with treated water, and inasmuch as the water is continuously recirculated in the closed system, internal corrosion, scaling or contamination are practically non-existent on high-temperature water land installations when properly maintained. The extremely small high-temperature water losses occurring at pump glands can be made up by employing a make-up pump to draw preheated treated water and introduce it into the system. Another factor in favoring high-temperature water is the fly-wheel effect or storage capacity in the system to handle sudden demands or peak requirements.

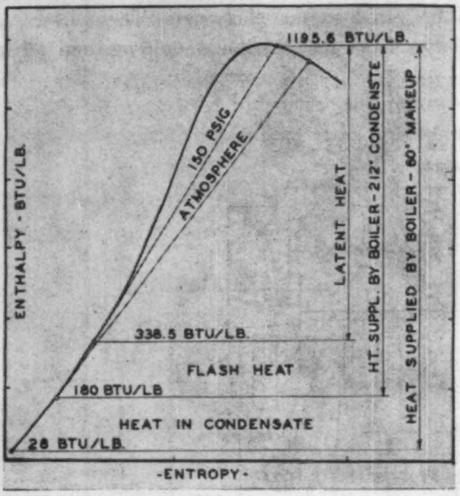


Fig. 5 — Enthalpy-entropy diagram of steam heating

Safety of High-Temperature Water

High-temperature water is considered safer than steam. This has been well established from land experience over the past 25 years. However, any high-pressure system has operational risks and requires not only good design, but experienced operation.

Conclusion

When absorption refrigeration units are developed for shipboard, additional fuel economies can be effected by employing high-temperature water as the generating medium in producing chilled water for air conditioning. With the advent of nuclear-powered ships, high-temperature water offers the best solution as the heating medium for the numerous applications mentioned previously. High-temperature water can be produced directly in the same generator where the reactor heat is extracted for production of steam to drive the ship's turbine.

The shipbuilding industry is constantly striving to attain greater efficiencies in developing the heat balance of its power plant. Steam cycle efficiencies are ever increasing. The consideration of high-temperature water aboard ship could result in a significant step toward this objective.

Acknowledgment

The author wishes to acknowledge the cooperation of P. A. Geiringer of the American Hydrotherm Corp. for his technical assistance in the preparation of data and calculations which form an invaluable contribution to this paper.

NEIL D. ADAMS RETIRES

Neil D. Adams, a member of the Society since 1929 retired as superintendent of the Franklin Heating Station at Rochester, Minn., on January 1st. Included among his Society activities was membership on the Council from 1938-40.

Mr. Adams has been connected with the Franklin Heating Station since the period of its design in 1925. At that time, he was connected with the firm of Ellerbe and Company of St. Paul, Minn. In 1929, Mr. Adams became superintendent of Franklin Heating Station, which position he has continued to occupy since.

He worked out the design for the well-known system of heating and ventilating used in the Mayo Clinic Plummer Building, and which used individual thermostatic controls in the various rooms. The method and modification of it has since been put into many installations.

Mr. Adams is also interested in oxygen chambers and took part in the design and construction of such chambers at the Mayo Clinic. Mr. Adams also took part in the installation of air conditioning in various buildings at the Clinic. He was always active in local civic movements in Rochester, Minn. He expects to continue to reside in Rochester.

HEAT PUMP STANDARD AVAILABLE

The Air-Conditioning and Refrigeration Institute has issued a new standard No. 240-57, entitled *Unitary Heat Pump Equipment.*

The standard was issued to establish minimum industry standards of performance of unitary heat pumps and to provide means for establishing reliable ratings. It applies to factory-made residential, commercial, and industrial heat pumps or matched assemblies as manufactured or assembled by a manufacturer. It does not apply to field-modified cooling units which may be converted to heat pump operation, nor to room air conditioners.

The standard was developed by an ARI sub-committee of which W. L. McGrath, Syracuse, N.Y., a member of the Society, acted as chairman.

REBMANN AND GAY REORGANIZE

The partnership of Rebmann and Gay, consulting engineers in St. Louis, Mo., has been expanded into a new partnership known as Rebmann Gay Herold.

The new firm will continue to operate as formerly, with improved quarters and a larger staff. The firm offers a complete consulting service in all phases of mechanical and electrical work. C. E. Gay, Jr., Society member since 1953, is a member of the firm.

Big Plans for Semi-Annual Meeting Minneapolis, June 23-25, 1958

The word from Minneapolis is that *you will miss plenty if you miss the Semi-Annual Meeting of the Society!*

It may seem a little early to think about a summer vacation, but when the family learns of the wonderful Minnesota resort areas and the special events planned by the Minnesota Chapter Committee on Arrangements, the Semi-Annual Meeting and the family vacation will become synonymous.

Briefly here are the highlights of what may be expected in Minneapolis the week of June 23rd. ASHAE headquarters will be the Pick-Nicollet Hotel, and the Semi-Annual Meeting, committee meetings and most of the special events will take place there.

However, simultaneously the 54th Annual Meeting of the *American Society of Refrigerating Engineers* will be held in Minneapolis with headquarters in the Leamington Hotel.

ASHAE and *ASRE* are arranging their meetings so that it will be possible for members and guests to attend one or more of the sessions arranged by each Society.

Furthermore, the ASHAE Minnesota Chapter and the *ASRE* Twin Cities Section are cooperating in the planning of special events and ladies' and children's activities.

The general chairman of the ASHAE Minnesota Chapter Committee on Arrangements is J. S. Locke, with G. M. Kendrick and J. F. Siegel as co-chairmen. The honorary chairmen are John E. Haines and F. B. Rowley, both past presidents of ASHAE. The *ASRE* Twin Cities Section general chairman is V. D. Wissmiller.

Among the special events the local committees are working on together are a Sunday evening, June 22, *ASRE* informal affair with ASHAE members invited; a Monday evening, June 23, ASHAE old-style hoedown and county fair with *ASRE* members invited; and on Tuesday evening, June 24, a joint Banquet for both Societies.

The ASHAE Minnesota Chapter and the *ASRE* Twin Cities Section also are cooperating in arranging inspection trips, tours, ladies' events and children's activities. Typical of this is a luncheon for the ladies registered with either Society.

Other plans under consideration by the local committees should contribute much to the comfort and pleasure of everyone attending the meetings in Minneapolis next June.

The ASHAE Semi-Annual Meeting is planned to consist of 5 sessions during which 9 papers and 2 symposiums are planned for presentation. The symposium subjects are (1) thermal insulation, a discussion of reflective and bulk insulation, block and pipe insulation, vapor problems in thermal insulation, thermal insulation for nuclear systems, surfacings for glass fiber, and foam thermal insulation; and (2) condensing methods, including cooling tower design and performance, evaporative condensers, air-cooled condensers, and an economic evaluation of condensing methods.

Every member and his family will enjoy visiting Minnesota and participating in the various activities. As a member, interest and satisfaction will be derived from attending the various sessions and committee meetings.

Preliminary Technical Program

Semi-Annual Meeting

June 23-25, 1958

Pick-Nicollet Hotel — Minneapolis, Minn.

Monday — June 23

9:00 a.m. FIRST SESSION
Call to Order — Pres. E. R. Queer
Paper on the Performance of Water Cooled Luminaires
Paper on Pulsations in Gas Furnaces
Paper on Evaluating Air Cleaners

Tuesday — June 24

9:00 a.m. SECOND SESSION
Call to Order — 1st Vice Pres. A. J. Hess
Winter Infiltration Through Swinging-Door Entrances in Multi-Story Buildings, by T. C. Min
Corrosion Inhibition on Tubes in Low-Pressure Steel Boilers, by W. A. Keilbaugh and F. J. Pocock
Laboratory Paper Concerned with Shading of Canvas Awnings

9:30 a.m. THIRD SESSION
Call to Order — 2nd Vice Pres. Walter A. Grant
Symposium on Thermal Insulation
P. N. Vinther, *Symposium Manager*
M. W. Keyes, *Moderator*
Reflective and Bulk Insulation, by William Turberville
Block and Pipe Insulation, by R. B. Crepps
Vapor Problems in Thermal Insulation, by N. B. Hutcheon
Thermal Insulation for Nuclear Systems, by G. W. Pomeroy
Surfacings for Glass Fiber and Foam Thermal Insulation, by W. P. Ellis

Wednesday — June 25

9:30 a.m. FOURTH SESSION
Call to Order — Treas. J. H. Fox
Symposium on Condensing Methods
W. G. Hole, *Symposium Manager*
A. J. Hess, *Moderator*
Cooling Tower Design and Performance, by John Engalitcheff
Evaporative Condensers, by D. D. Wile
Air Cooled Condensers, by Otto Nussbaum
Economic Evaluation of Condensing Methods, by J. L. Wolf

9:30 a.m. FIFTH SESSION
Call to Order — Pres. E. R. Queer
Activated Charcoal for Air Purification, by H. L. Barnebey
Cooling Load from Pretabulated Impedances, by Harry Buchberg
Solar Energy Utilization for Heating, Cooling, Distillation and Drying — prepared by TAC on Solar Energy Utilization
Report of Resolutions Committee
Unfinished Business; New Business; Adjournment

HOTEL
NICOLLET

British and European Design and Construction Methods

By

George Applegate, Jr.

The author is Technical Director, G. Applegate and Sons, Ltd., Westcroft, Trowbridge, England. A presentation at the Symposium on High-Temperature Water at the 64th Annual Meeting of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, Pittsburgh, Pa., January 28, 1958.

EUROPEAN ENTHUSIASM for the use of high-pressure hot water as a medium for heating has prompted the presentation of this short paper on its practical uses with the hope that it will increase interest in the United States and that the information contained will be of some practical use in the design and application of this medium for heating and process work.

In Great Britain and Europe generally, applications include laundries, bakeries, enamelling and paint works, rubber works, plastic industry and space heating for larger industries and commercial buildings and various other types of specialized industrial applications.

The original high-pressure hot water system was developed by A. M. Perkins, London, and was known as the *Perkins System.* This system generally operated at a temperature from 250 to 350 F. High-pressure hot water is the heat transmitting medium used in high-pressure hot water systems and operates at a temperature above its atmospheric boiling point but it is maintained in a liquid state by the use of high pressures, the water being used in a closed piping system and distributed from a central heat producing source by means of pumping.

As a point of interest comparisons between high-pressure hot water heating installations and other systems should be first considered and as high-pressure hot water is naturally a development of low-pressure hot water heating, its comparison with this method of heating should first be considered and advantages of high-pressure hot water are as follows:

1. It is possible by means of a high operating temperature to reduce the size of the heating elements, pipework and plant in general;

2. It is possible when operating at high pressures to allow for a very large temperature drop throughout the heating system, which results in a great amount of heat being given up and, a noticeable reduction in pipe sizes required for a given quantity of heat.

Advantages of high-pressure hot water heating over a steam heating installation are as follows.

1. The capital cost of the installation is generally greatly reduced and on larger installations the total savings can be considerable.

2. Operating costs are usually more favorable due to the fact that in a high-pressure hot water system, return water is either passed direct to the boiler or is re-circulated through the distribution system thus effecting a considerable saving in losses from steam traps and other collecting equipment. There is also a greater ease in the regulation of water to suit varying loads and temperatures and both these additional items are likely to lead to savings in fuel. Also losses through inefficient or worn steam traps can be considerable and require cold water make-up treatment with increased running and maintenance costs.

3. Maintenance costs are generally greater with steam heating installations and perhaps the most important point worthy of consideration is the fact that with high-pressure hot water the return water usually enters the boiler at a temperature of not lower than 270 F, while temperatures of condensate return systems and steam installations are comparatively lower. It is possible with high-pressure hot water installations to regulate temperatures to within ½ a degree by merely setting a hand wheel.

The plastic industry was not slow in taking up these advantages and the rubber industry is following suit.

It is common practice in Europe to use high-pressure hot water in dye vat heating where temperatures can be maintained very accurately and it has been proved in actual practice that fuel consumption of accurately run high-pressure hot water installations is as much as 25 percent less than for equivalent steam heating.

High-pressure hot water has been employed successfully on small heating plants but the advantage of this type of system is most apparent when it is used on some of the larger industrial schemes and shows its greatest advantage on schemes between 15 and 25 million Btu per hour.

Only a few years ago it would have been common practice to utilize steam for heating installations of this size. It is customary in Europe to combine both steam and high-pressure hot water heating installations and it is usual that the system is split into two at the boilerhouse, one portion being used for steam process work where steam is a necessity and the other for certain processes and steam heating.

While giving the foregoing advantages on high-pressure hot water as a medium for heating and process work it is only fair to mention some disadvantages and the most predominant of these are as follows.

1. There is difficulty in maintaining pressures and the prevention of immediate flashing of water into steam if pressure fails.

2. Greater care and accuracy are required in designing an initial installation; by reason of the small pipes used very great care is required in pipe sizing and accurate regulation of the system is *most* essential. Lack of accurate data is one of the greatest disadvantages today in the development of this type of system. In actual practice it has been found that pipe sizing is very similar to that for a high-pressure steam installation but certain considerations taken for the design of a low-pressure hot water scheme are also embodied. The question of pipe sizing is dealt with later in this paper.

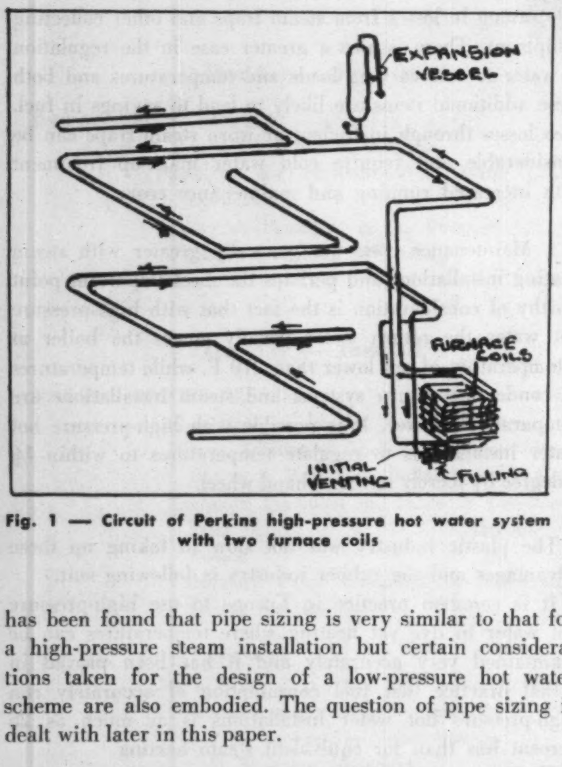


Fig. 1 — Circuit of Perkins high-pressure hot water system with two furnace coils

Fig. 1. shows a circuit of a standard Perkins high-pressure hot water system and it will be seen that the furnace coils are made up of small diameter, high-pressure tubing.

Fig. 2. shows a simple high-pressure hot water boiler connection arrangement, (A) and (B) indicating the main flow and return valves and (C) the mixing valve between the pump delivery and the boiler. The use of this mixing valve plays a very important part and the sequence operation of these valves is generally as follows.

The system would be generally started up with flow and return valves (A) and (B) fully opened and the mixing valve (C) closed. The system is then brought up to its maximum operating temperature and the mixing valve (C) is gradually opened until the return water is mixed with the flow water so that the cooler water is delivered into the system until the correct operating temperature is reached. If an even lower temperature is required this can be obtained by gradually closing down the stop valve (A) on the boiler until it is almost closed.

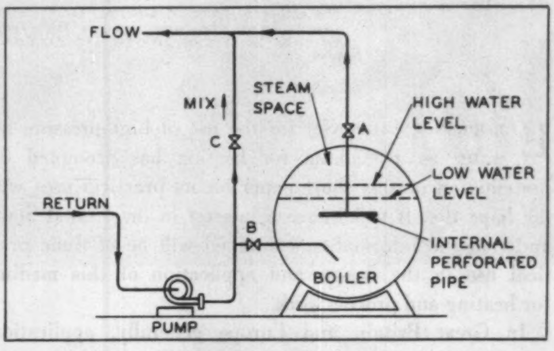


Fig. 2 — Boiler connections on simple high-pressure hot water system

Fig. 3. shows a similar simple arrangement but with a circulating pump fitted to the main flow. With a circulating pump fitted to the flow main it is important to see that the suction pipe is kept as short as possible, otherwise there is likelihood of the water flashing into steam on the suction side of the pump.

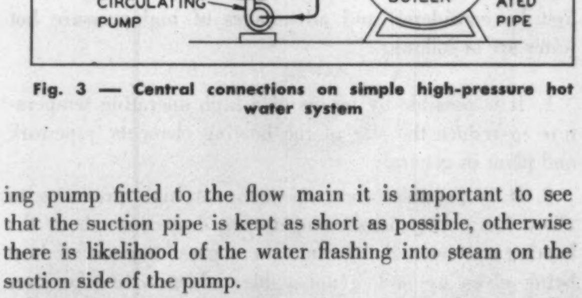


Fig. 3 — Central connections on simple high-pressure hot water system

It is also important to keep the resistance between the boiler and pump suction as low as is practicable and the essential feature of design is to make the connection to the side of the boiler with a fall away to the pump so there is no possibility of steam collecting in the flow pipe if the pump fails or is not operating.

On some of the larger systems such an arrangement may not be possible but it is, nevertheless, important to see that pump rooms and pumping plant are kept as close as possible to the boiler. Fig. 4. shows a larger installation with typical connections. As can be appreciated, the pumping plant is of prime importance on high-pressure hot water heating systems and these have to be especially designed for the job. Fig. 5. shows a sectional view of a typical high-pressure pump and special note should be made of the water-cooled bearings. It is not unusual that glands should also be cooled with running cold water. Except for these cooling features the pump is more or less the same as any other type of hot water circulating pump with the exception that the casing is usually of cast steel or semi-steel and should be constructed to suit the operating temperature of the boiler plant.

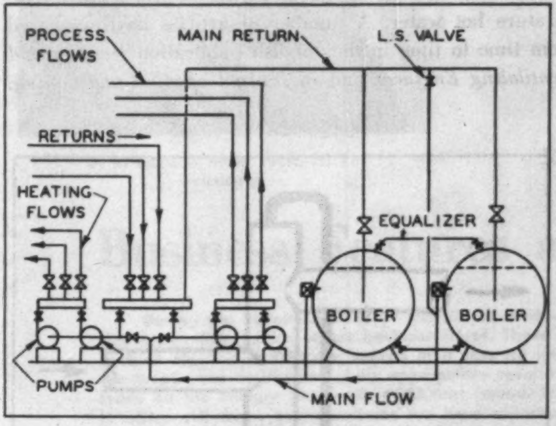


Fig. 4 — Central connections on more advanced high-pressure hot water system

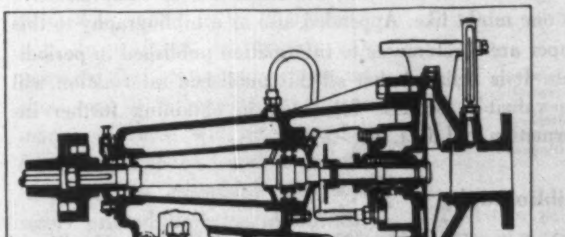


Fig. 5 — Sectional view of high-temperature water pump of European manufacture

Standard ranges of pumps are available in Europe with working pressures up to 300 lb per sq in. and temperatures up to 400 F. With some slight alterations and modification pumps are also constructed for higher temperatures up to 650 F.

As with some of the larger low-pressure hot water heating installations, it is advisable to provide duplicate pumps for stand-by purposes.

The use of special boilers is not usually necessary and any standard steam boiler can be used equally well for a high-pressure hot water heating system. This is gratifying because it enables some existing steam installations to be converted fairly easily to high-pressure hot water.

Unfortunately there is a serious lack of data for any design engineer to work on and the author admits that there is, to a certain degree, an ulterior motive in presenting this paper. It will be recalled that mention was made of the question of pipe sizing. This is a controversial subject whether it is for steam or hot water and in the application of high-pressure hot water is even more interesting. There are very little really accurate data on this particular application and a great deal of common sense engineering knowledge has to be taken into consideration when designing a high-pressure hot water heating installation.

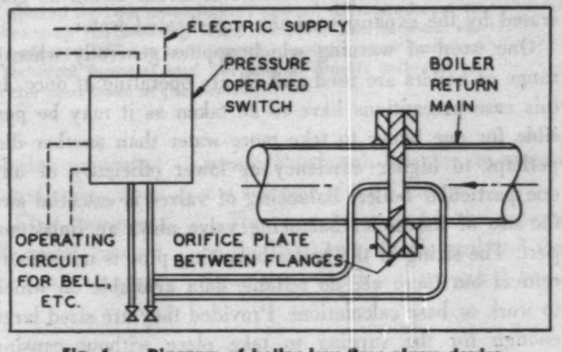

ELECTRIC SUPPLY
PRESSURE OPERATED SWITCH
BOILER RETURN MAIN
OPERATING CIRCUIT FOR BELL, ETC.
ORIFICE PLATE BETWEEN FLANGES

Fig. 6 — Diagram of boiler low-flow alarm device

A standard set of tables is available giving properties of water at high temperatures and the formula for pipe sizing usually used in Europe is the Blair No. 2 formula published by the *Institution of Heating and Ventilating Engineers* based on investigations by MacAdams and Sherwood. These formulas are no doubt well known in the United States but the application of practical engineering experience and common sense plays a very important part in the design of any high-pressure hot water heating installation.

It will be seen therefore that there is a serious lack of technical information on this subject and while there are a very large number of installations in Europe and a large number of installations being installed at the moment, these are usually installed by firms who have specialized in this type of system and who have gained practical knowledge through bitter experience. They are not usually willing to publish their experiences and it is hoped that this short paper will give some useful information which will encourage those in the United States to carry out experiments and installations of high-pressure hot water heating systems.

It is hoped that it will also arouse some interest among the universities in the United States, and technical departments and others who have facilities to carry out extensive research which is most certainly required in one or two phases in this application.

In Great Britain it is necessary to take into consideration certain requirements laid down by the Factory Act and these regulations have to be complied with. In the United States also there are Government Regulations.

Safety Devices

Various types of safety devices have been developed and Fig. 6 shows a diagram of a boiler low flow alarm device. In the event of the pressure in the system being suddenly reduced such as would occur if a pipe or heating element burst — large quantities of steam would be generated by the expansion of the superheated water.

One word of warning which applies generally when a range of boilers are used and all are operating at once. In this case precautions have to be taken as it may be possible for one boiler to take more water than another due perhaps to higher efficiency or lower efficiency of any one particular boiler. Balancing of valves is essential and the use of the boiler balancing valve plays an important part. The sizing of the boiler balancing pipe is not usually critical but there are no reliable data available on which to work or base calculations. Provided they are sized large enough for the surging to take place without causing changes in water levels or pressures, no difficulty is likely. One would recommend a minimum size of 2½ or 3 in.

The author has not touched on the subject of alternative types of pressurized system such as the nitrogen pressurized system. This would require an entirely separate paper to cover this item alone.

HTW

Order Form — Bulletin on

HIGH-TEMPERATURE WATER

Bulletin contains 5 papers presented at Symposium on HIGH-TEMPERATURE WATER (with digest of discussions) at Pittsburgh Meeting, January 28, 1958. Please mail ...... copies at $1.50 each, postpaid.

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Published Information

A considerable amount of information has been published in the United Kingdom on the subject of high-temperature hot water. A number of articles have appeared from time to time in the English publication *Heating and Ventilating Engineer* and in *Journal of Air Conditioning.*

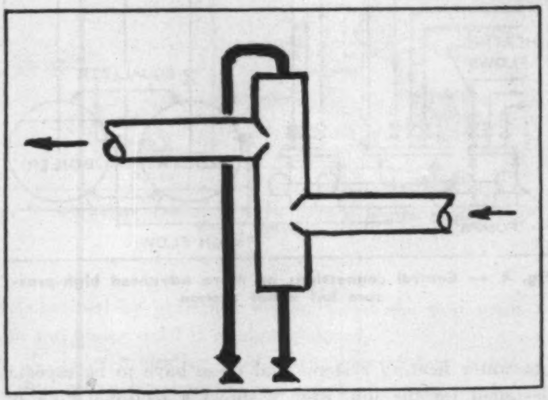

Fig. 7 — Air bottle for venting purposes

Also 2 useful books have been published in the United Kingdom on the subject, but neither is as comprehensive as one might like. Appended also as a bibliography to this paper are 5 references to information published in periodicals. It is believed that all this published information will be valuable to those interested in obtaining further information and data.

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P. B. Gordon, New York, N. Y.
President

E. R. Queer, University Park, Pa.
President-Elect

Report of Business Features at 64th Annual Meeting

During the seven sessions of the ASHAE 64th Annual Meeting at Pittsburgh, Pa., January 27-29, 1958, action was taken on important business items. These included the reports of the Officers and of the Council; a report on election of Officers; results of a vote on various proposed By-Law amendments and on an amendment to the employees retirement plan; appropriate resolutions concerning the meeting were adopted; and a press release on the merger plan with *ASRE* was issued. The newly elected Officers and Council members were installed in office. All these business items are here reported. The technical features and the special events included on the Meeting Program will be the subject of a like report in the next issue of the Journal.

Of the seven sessions on the program at the Annual Meeting, two were of the symposium type and one was a topical session. A total of 17 technical papers were presented of which one was made available by title only. All these papers have been printed in earlier issues of the JOURNAL. In addition, ten papers were prepared for the two symposium sessions and it is expected that summaries of these will be printed in future issues of the JOURNAL and that they will be assembled into separately printed Bulletins. Availability of these Bulletins will be announced.

While attendance records for annual meetings were not broken, still available facilities were taken by the total of 945 who registered, including 596 members, 208 guests and 146 ladies, coming from 38 states and Canada with one member present from England. With most of the programmed events taking place on a single floor at the Penn-Sheraton Hotel, the Committee on Arrangements of the Pittsburgh Chapter succeeded in holding attention and handling all events very well.

Many of the business items were programmed at the first session. As a result, President Gordon proceeded to these items immediately after opening the session. First, however, he called on T. F. Rockwell, general chairman, Committee on Arrangements, Pittsburgh Chapter, to extend the welcome of the Chapter.

This was followed by the reports of the President, the Council and the Treasurer, which are presented here.

Annual Report of the President

Society membership increased by nearly 700; membership growth pattern may change; Regional Plan for operation is 2 years old; Long Range Planning tied to growth and finances; operating costs may need corrective measures; professional investment service retained; new Director of Research; improvement in technical information made available; new Educational Planning Committee; the Council actions on proposed merger of *ASHAE* and *ASRE*.

I want to welcome you to the Annual Meeting of the Society. I am confident we will have an informative and enjoyable meeting in Pittsburgh. The host and Society Committees have planned very well. I plan to keep my report brief, as much of the detailed story of the year's happenings will be covered in several other reports to be presented during the Meeting.

Our Society has again grown in size. The total number on the rolls as of January 1 is 11,713 as compared with 11,021 one year earlier and, with the addition of 4 new chapters, we now have a total of 71 chapters. New chapters were installed at Johnstown, Pa.; Jacksonville, Fla.; Long Island, N. Y.; and two weeks ago at Savannah, Ga.

The growth in membership to 11,713, which compares with 3,100 in 1940 and 7,700 in 1950, has been extraordinary and, obviously, this growth is related to the expansion of the air-conditioning industry during this time. The growth in 1957 was a net increase of 692 members of all grades, which compares with an increase of 665 in 1956 and 560 in 1955. Not only have air-conditioning efforts expanded in volume, but, more so, the work has become more technically complex. More and more engineers are required and will be required for all levels of heating, ventilating and air-conditioning operations, such as research, administration, consulting engineering, teaching, contracting, sales and manufacturing.

While the signs of the times do indicate a change or slackening in intensity in some areas of our work during the past 6 months, I would predict that the general growth pattern of the past few years will be maintained during the coming years. As for the Society, the slackening in intensity has shown itself by an increase in the number of dues delinquents as of the present time, and, if this situation is not corrected during the next few months, the membership growth pattern will go through a leveling off period.

It is interesting to note what this past growth has done to the Society operations. In recent years, we have gone over to the regional plan of operations, and, with two years of such operations now behind us, I would say that we have improved on the liaison between chapters and the Council, and created a base to permit the further expansion expected in the next few years.

Because of these same growth reasons, studies have been under way concerning the organizational framework of the Society. The Long-Range Planning Committee has considered ways to improve the workings of committees and staff for better supervisory control and better administration. However, this problem of organization is so closely related to those corollary problems of finances and space requirements that considerable additional study will be required by the Council.

The net worth of the Society again increased during the past year, but it is important to note that the non-research activities have been operating on a deficiency basis insofar as budgeted annual income is compared with budgeted expense. Very much like industry, the outgo *vs.* income squeeze has become apparent. Operating costs have been increasing because of inflationary influences, and, at the same time, income figures have not always been realized.

The Treasurer's Report will compare income *vs.* outgo on a cash basis. It will show that the actual income of all non-research activities was about $16,000 higher than the expected income, while the income for research activities was about $9,000 less than the expected income, or a net of about $7,000 better than the budgeted figure for 1957. The expense side of the picture will show that the actual non-research expenses ended up about $6,000 more than the budgeted expense, but that the research expenses were about $57,000 less than the expected expenditure for 1957. While the situation is not yet serious, certain corrective measures will be required before the next budget preparation time in September.

Further in the area of finances, a new *Employees' Pension and Group Insurance Plan* was approved by Council at its June meeting and put into operation on November 1 last. This new plan tends to eliminate some of the shortcomings of the old plan.

For several years, the Council has explored the need for professional counsel to manage the Society's reserve and invested funds. During the past year, the Bankers Trust Company of New York was engaged to provide the Society with a continuing investment advisory service. The prime objective is to assure that the Society's *long term,* or what might be considered endowment, funds are invested in the best manner possible, not only as to annual income, but as to protecting the future true worth of the principal. This requires the advice of professionals.

In June the Society found itself in the fortunate position of being able to obtain the services of Prof. B. H. Jennings (for many years with the Northwestern Technological Institute) as the Society's Director of Research. Professor Jennings, with his intimate knowledge of the workings of the Society's research establishment, provides us with the needed assist to step up the Society Research Program. The Committee on Research report will describe these activities and their plans.

I believe the area of Society activities that encompasses *technical information available to all* to be the most important single activity in the Society's framework of operations. This general area includes all research activities and the work of many Technical Advisory Committees, publications, papers, TRANSACTIONS, THE GUIDE, meetings, symposia, and JOURNAL. These media provide for a free and open exchange of information about design and operations, and are of extreme value to the members, to all in the allied industries and to the using public.

Our Society should be proud of the part it has played in these contributions. This year, many innovations and many improvements were made in furthering this activity, with more papers, more symposia, an improved GUIDE, and a more interesting and appealing JOURNAL. I want to commend all of the committees concerned (Program and Papers, Publication, Guide, Guide Advisory, Public Relations, Research, Codes and Standards), and all staff personnel associated with these many activities for their splendid efforts in this direction.

I am happy to say that a pet project of mine has been favorably developed during the past year by the Long-Range Planning Committee. This concerns a proposal to set up an Educational Planning Committee that will develop and maintain a national program to attract more engineers, scientists and technicians into our field. In today's extremely technological way of life, our industry is faced with the problem of competing with all other industries for the best men possible to obtain.

I have one bit of news regarding our Council Meeting yesterday. Of the many routine and many interesting problems that were discussed, one will be forcefully brought to your attention during the coming spring. This concerns our relationship with the *American Society of Refrigerating Engineers.* You may know that the Councils of the two Societies and a Joint Committee have been exploring not only the problem of closer working relations between the two Societies, but also the consideration of a possible merger of the two Societies. Yesterday, the Joint Committee submitted an interim report to the Councils of the two Societies, and the ASHAE Council approved taking the following action:

1. That the officers of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS carry the information of the proposed merger plan to the membership of the Society through the medium of the seven Regional Meetings, and
2. That the Joint Committee carry forward their detailed study of the specific problems concerned with possible merger.

You will be hearing much more about the many problems and considerations during the coming spring.

It is time for me to bring this brief report to a close. In so doing, I want to say a few words to express my sincere appreciation to all those who have served our Society so well, and, without whose wholehearted efforts, no one could have served at all. I want to thank all of the other officers and members of Council, and the various committeemen, and all of the staff for their loyal work, guidance and cooperation.

I have tried to serve, and for this privilege I thank you.

Respectfully submitted,
P. B. GORDON, *President*

1957 Report of the Council

Presented here is the 1957 Annual Report of the Council of the Society, as required by the Membership Corporations Law of the State of New York. Included also is a summary of the Treasurer's Report, a part of which is the Accountant's Report (see pages 176 to 178).

Four quarterly meetings of the Council were held during the calendar year 1957, the organization meeting being convened at the Conrad Hilton Hotel, Chicago, Ill., February 28; the spring meeting on May 4 at The Roosevelt Hotel, New Orleans, La.; the summer meeting on June 23 at the Manoir Richelieu, Murray Bay, Quebec, Canada and the fall meeting, October 12 at the Hotel Statler, Cleveland, Ohio.

At the organization meeting the Council approved the personnel of the Council, General and Special Committees and appointed the following Regional Directors: John Everetts, Jr., Region 1; A. B. Algren, Region 3; C. B. Gamble, Region 5 and D. M. Mills, Region 6.

A procedure for the election of Honorary Members and the conferring of the grade of Fellow was adopted; renewal of the ASHAE-*ASRE* Exchange Service Plan was authorized and depositories for Society funds were approved.

Among other important actions taken by the Council were the following:

1. Approved 5 charters for Chapters at (*a*) Johnstown, Pa.; (*b*) Jacksonville, Fla.; (*c*) Long Island, N.Y. (Garden City); (*d*) Savannah, Ga., and (*e*) Southern Alberta (Calgary)

2. Appointed B. H. Jennings as the new director of research effective August 1, and F. W. Hofmann as assistant secretary.

3. Elected 1 Honorary Member, 23 Life Members and conferred the grade of Fellow on 8 members.

4. Announced the personnel of the Guide Committee (9 members) with H. W. Alyea as Chairman and selected 5 nominees for a three-year term on the Committee on Research.

5. Authorized the revision of the employees' pension plan and a new group insurance plan.

6. Selected Prof. G. L. Tuve as the recipient of the F. Paul Anderson Medal and requested a nomination from the University of Illinois for the ASHAE-Homer Addams Award.

7. Recommended By-Law revisions to enlarge Council Committees and change membership qualifications. It also approved Chapter By-Law changes for Chapters, a new Operational Guide for the Nominating Committee and revisions for the Operational Guide of the Committee on Research.

8. New rules were adopted on the publication of Symposium talks.

9. A new Advisory Investment Service was authorized; a new rate schedule for the 1959 Guide was approved and some additional rules on travel expenses were adopted. Also, the Council adopted a budget of $706,995.00 for the fiscal period, November 1, 1957 to October 31, 1958.

10. Dates were selected for the Semi-Annual Meetings in 1959 and 1960, the 67th Annual Meeting in 1961 and the 69th Annual Meeting in 1963, as well as a schedule for Chapters Regional Committee meetings in 1958.

11. Council decided to establish Society headquarters in the proposed Engineering Societies Center in New York when the new facility is opened in 1960.

12. As required by Section 46 of the Membership Corporations Law of the State of New York, the following financial report is presented by the Council and filed herewith:

Assets — October 31, 1957

The Society has the following Assets:

Land and Laboratory Buildings at Cleveland, Ohio	$ 81,012.89
Furniture and Equipment, Tools, etc. at New York and Cleveland	37,669.30
On deposit in New York and Cleveland banks	291,671.81
Securities and Accrued Interest (Investment Account) with Bankers Trust Co., New York	181,364.69
Accounts Receivable	24,097.20
Inventories	6,211.34
Prepaid Expenses	11,956.49
TOTAL ASSETS — 1957	$633,983.72
TOTAL ASSETS — 1956	500,891.00
INCREASE FOR THE YEAR	$133,092.72

Liabilities — October 31, 1957

The Society has the following Liabilities:

Accounts Payable	$ 885.54
Federal Withholding Taxes	1,956.00
Accrued Accounts	15,550.00
Deferred Income:	
Research Projects	2,321.51
Prepaid Dues, Admission Fees, etc.	30,184.46
Reserve for Fluctuation in Canadian Exchange	122.71
TOTAL LIABILITIES	$ 51,020.22
Net Worth (Funds)	582,963.50
TOTAL LIABILITIES AND NET WORTH	$633,983.72

At the end of the fiscal year, October 31, 1957, the Balance Sheet shows the Society's net worth as $582,963.50 compared to $459,751.92 on October 31, 1956, a net gain of $123,211.58.

Total cash in New York and Cleveland banks $291,671.81 consisting of $37,467.04 in General Operating Fund, $20,709.61 in Reserve Fund, $366.45 in F. Paul Anderson Fund, $57,757.55 in Research General Fund, $163,233.31 in Research Reserve, $807.27 in Research Endowment, $8,204.55 in Building Maintenance Reserve Fund, $449.35 in Building Fund, $294.19 in the ASHAE-Homer Addams Fund, $51.74 in the Education Fund of Life Members, $2,046.49 in the Gustus L. Larson Fund and $284.26 in the Investment Account at Bankers Trust Co., New York.

Now in the Investment Account at the Bankers Trust Co., New York, there are securities as follows: General Fund $13,178.92; Building Fund $38,814.60; Reserve Fund $119,158.01; F. Paul Anderson Award Fund $954.31, and Homer Addams Fund $9,543.11.

The Society's Reserve Fund now totals $139,867.62. As of October 31, 1957 the Research Reserve Fund had a balance of $163,233.31.

The Sources of Society Income were:

Admission Fees and Dues	$174,082.92
Publications	231,811.82
Interest	621.55
Research	338,067.55
Other Income	1,115.67
TOTAL	$745,699.51

Society Expenditures were:

Meetings, Committees and Chapters	$ 43,549.96
Publications	141,475.88
Headquarters	233,192.68
Research	207,946.56
TOTAL	$626,165.08

The insurance coverage of the Society is as follows: Fire for Buildings $201,000.00; for Contents $147,000.00; Sprinkler $15,000.00; Automobile Comprehensive Public Liability $100,000.00 — 300,000.00; Property Damage $25,000.00; Medical Payments $100,000.00; Bodily Injury $25,000.00 — 100,000.00; Public Liability, Premises, New York and Cleveland $100,000 — 300,000.00; Fidelity Bonds on Officers and all Employees $20,000.00. Workmen's Compensation is carried in New York and Ohio as required by law.

The Society has contributed to the Employees' Retirement Plan Trust $3,961.99 and the participating employees contributed a substantially similar amount deducted from salary.

The Society admitted the following members in the grades indicated since January 1, 1957:

Members	348
Associate Members over 30	370
Associate Members under 30	141
Affiliates	417
Students	152
TOTAL	1428

During the period January 1, 1957 to December 31, 1957, a total of 62 members in the Member, Associate Member, Affiliate and Student grades were reinstated; a total of 736 in all categories were dropped from the rolls: 196 resigned, 491 were cancelled and death claimed 49.

Net gain of members was 692. The overall status from January 1, 1957 as compared with January 1, 1958 is as follows:

	January 1, 1957	—	January 1, 1958
Honorary	4		5
Fellows	5		12
Presidential Members	22		20
Life Members	227		240
Members	4,653		4,886
Associate Members (over 30)	4,080		3,646
Associate Members (under 30)	—		594
Affiliates	1,848		2,130
Students	182		180
	11,021		11,713

The names and addresses of the candidates for membership were published in the JOURNAL of the Society each month during the year and are on record in the Secretary's office. The present membership total is 11,713.

Respectfully submitted,
P. B. GORDON, *President*
C. H. PESTERFIELD, *Treasurer*

Report of Treasurer

During the first session of the Annual Meeting, President Gordon called on Treas. C. H. Pesterfield, East Lansing, Mich., to present his report. Since much information concerning the activities of the treasurer is in the Report of the President and in the Accountant's Report (see pages 176 to 178), Treasurer Pesterfield filed no written report. However, he pointed out that total income

(*Continued on p.* 178)

Accountant's Report

Frank G. Tusa & Co., Certified Public Accountants
37 Wall St., New York 5, N. Y.

AMERICAN SOCIETY OF HEATING AND
AIR-CONDITIONING ENGINEERS, INC.
62 WORTH ST., NEW YORK, N.Y.

Gentlemen:

In accordance with the authority contained in the organizational meeting of the 1957 Council on February 28, 1957, we have examined the books of account of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, INC. — New York and Cleveland for the fiscal year ended October 31, 1957.

Our examination consisted of the verification of Assets and Liabilities as of the close of business October 31, 1957, and as sufficient a review of the income and expense accounts as we considered necessary to reflect, properly, the operations for the year then ended. This examination was conducted in accordance with generally accepted auditing standards, except as otherwise noted in the comments section, and included such auditing procedures and such other tests of the accounting records as we considered necessary under the circumstances.

We are pleased to present our report of this examination which includes the various statements and schedules listed in the table of contents. In addition thereto, we should like to direct your attention to the following comments which constitute an integral part of this report and which define the scope of our examination.

COMMENTS

ASSETS

CASH (Page 13)

On Hand	$ 150.00	
Investment Advisory Account	284.26	
In Checking Accounts	76,992.24	
In Savings Banks	214,245.31	$291,671.81

All cash was verified either by count or by direct communication with the depositories. All balances reported to us were reconciled to those reflected on the books of account and were correct. Every depository responded.

DUES AND ACCOUNTS RECEIVABLE

The following classification of Dues and Accounts Receivable were submitted to us by the internal accounting staff:

MEMBERSHIP		
Members	$ 5,842.41	
Associate Members (Over 30)	8,140.88	
Affiliates	5,621.25	
Associate Members (Under 30)	935.25	
Students	11.00	$ 20,550.79
SUNDRY DEBTORS		9,377.03
		$ 29,927.82

We reviewed the system of internal control used in the accounting for the above receivable and found it to be adequate. No outside confirmation was requested of accounts receivable. We were, however, by means of other auditing procedures able to confirm substantially the above balances which in our opinion are correct. In the determination of the adequacy of the allowances for dues and accounts doubtful of collection we have reviewed the budgetary provisions for the fiscal year ended October 31, 1957 and such other pertinent data as we considered necessary. It is our opinion that the allowances for these doubtful accounts will be ample in absorbing possible losses due to non-collection for the budgeted year 1958.

The Research General Fund Accounts Receivable consists of a billing charge to the U. S. Navy Department for work completed during October, 1957 in the amount of $409.93, and a balance of $19,733.63 due from the Society General Fund for 40% of the dues specifically allocated to Research. The counterpart of this latter receivable of $19,733.63 is reflected as a current liability of the Society General Fund on page *10**. This $19,733.63 includes $7,841.82 of Dues Receivable which will be paid to Research when collected by the Society.

INVESTMENTS

A schedule of investments is to be found on page *15* of this report. In accordance with the authority contained in the Council meetings of February 24, May 3, and June 23, 1957 and the directions contained therein, the Bankers Trust Company, New York was retained to provide a continuing advisory service for the investments of Society cash as allocated by the Council upon recommendation by the Finance Committee in cooperation with its Investment Sub-Committee.

Confirmation was received from the Bankers Trust Company of the investment portfolio held for the credit of the Society as at October 31, 1957. A statement of the Investment Advisory Account is to be found on page *14* of this report. This statement reflects the individual undivided interests of each participating fund after they have been charged with their proportionate share of losses resulting from a recognition of the decline of $9,238.90 in the market value of the investment portfolio.

INVENTORIES

The following inventories were verified either by physical count or by direct communication with the printers.

TRANSACTIONS	$5,372.88
Emblems	538.46
Guide Paper	300.00
	$6,211.34

A schedule of TRANSACTIONS inventories follows:

Volume	Year	Quantity	Cost of each	Total cost
1-56	1895-1950	5,203	0.4000	$2,081.20
57	1951	640	2.2750	1,456.00
58	1952	123	1.7960	220.91
59	1953	408	2.000	816.00
60	1954	145	2.0665	299.64
61	1955	135	2.0742	280.02
62	1956	103	2.1273	219.11
				$5,372.88

ADVANCE DEPOSIT — AIR TRAVEL	$ 425.00

This deposit placed with the United Airlines was confirmed by direct communication.

PROPERTY FUND ASSETS (Page 12)	$118,682.19

The Land and Buildings, Instruments, Equipment and Furniture and Fixtures are reflected on the Statement of Financial Condition at cost of acquisition. With the exception of Land and Buildings all Assets have been depreciated at the rate of 10% per annum.

In accordance with the resolution adopted by the Council at its meeting of January 23, 1949, depreciation was not provided on the buildings for the current fiscal year.

During the current year, in response to a request of the Building Committee, the realty located at 7218 Euclid Ave., Cleveland, Ohio, was appraised by Mr. Ben B. Byer of Cleveland, Ohio, who submitted the following *Market Values* under report dated October 4, 1957:

Land	$ 50,000.00
Buildings	75,000.00
TOTAL APPRAISED MARKET VALUE	$125.000.00

DEFERRED INCOME	$ 25.869.14

The membership classification of the dues prepaid by elected members follows:

MEMBERSHIP	
Members	$ 12,420.26
Associate Members (over 30 years)	7,575.38
Affiliates	4,619.50
Associate Members (under 30 years)	1,184.00
Students	45.00
Fellows	25.00
	$ 25.869.14

FUNDS

There is included as a part of this report, a Statement of Funds reflecting the changes that occurred therein during the fiscal year ended October 31, 1957.

INSURANCE

The insurance coverage of the Society follows:

FIRE		
Building (Cleveland)		$201,000.00
Personal Property:		
Cleveland	$104,000.00	
Printers	17,000.00	
New York	26,000.00	147,000.00
SPRINKLER LEAKAGE		
Waverly Press	10,000.00	
Horn-Shafer Co.	5,000.00	15,000.00
NON-OWNERSHIP — AUTOMOBILE — COMPREHENSIVE		
Public Liability		100/300M
Property Damage		25M
Medical		1M
GENERAL PUBLIC LIABILITY — PREMISES		
New York and Cleveland		
Liability		100/300M
Bodily Injury		25/100M
COMMERCIAL BLANKET BOND		
President, Treasurer, Chairman of the Finance Committee, and First and Second Vice-Presidents		20,000.00

OPERATIONS

For the fiscal year ended October 31, 1957, the operations of the Society resulted in an Income in Excess of Expenses, in the amount of $118,864.14 as compared to $33,031.89 in the prior year or an increase of $85,832.25. However, it should be noted that the current years income included Exposition Contribution of approximately $132,000.00. Without this income, Society operations would have been shown an Excess of *Expenses over Income* of approximately $46,000.00 for the current year, or an unfavorable change of approximately $79,000.00 as compared to the prior year. This unfavorable change is principally due to an increase of almost $60,000.00 in Headquarters Expenses. Of this increase, approximately $14,000.00 represents a charge for Dues and Accounts Doubtful of collection — Salary and wage cost have increased by $36,600.00 — the balance of $9,400.00 being reflected in the general rise of administrative costs of rent, telephone and telegraph, printing and stationery and others. A condensed comparative Statement of Income and Expense is to be found on page 24 of this report.

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*Page numbers refer to table of contents in accountant's submitted report.

CONCLUSION

In our opinion the accompanying Statement of Financial Condition, the related Statement of Income and Expense and Statement of Fund Balances present fairly the financial condition of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, INC., New York, N. Y. at October 31, 1957 and the results of its operations for the year then ended in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

FRANK G. TUSA & CO., Certified Public Accountants

Dated December 11, 1957 New York, N. Y.

STATEMENT OF FINANCIAL CONDITION

AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, INC. — New York, N. Y., October 31, 1957

ASSETS

PAGE					
	GENERAL FUNDS				
11	Society - New York			$ 90,532.25	
11	Research - Cleveland			79,869.92	$170,402.17
	RESERVE FUNDS				
	Society - New York				
13	Cash on Deposit		$ 20,709.61		
	Investments				
14	Undivided interest in Investment Advisory Account	$125,218.55			
	Less: Allowance for Decline in Market Value thereon	6,060.54	119,158.01	139,867.62	
	Research - Cleveland				
13	Cash on Deposit			163,233.31	303,100.93
	CAPITAL ASSET FUNDS				
12	Property Fund			118,682.19	
	Building Fund				
13	Cash on Deposit		449.35		
	Investments				
14	Undivided interest in Investment Advisory Account	40,788.75			
	Less: Allowance for Decline in Market Value thereon	1,974.15	38,814.60	39,263.95	
	Building Maintenance Reserve Fund				
13	Cash on Deposit			8,204.55	166,150.69
	ENDOWMENT FUNDS				
	F. Paul Anderson Award				
13	Cash on Deposit		366.45		
14	Undivided interest in Investment Advisory Account	1,002.85			
	Less: Allowance for Decline in Market Value thereon	48.54	954.31	1,320.76	
	Homer Addams				
13	Cash on Deposit		294.19		
	Undivided interest in Investment Advisory Account	10,028.49			
	Less: Market Decline	485.38	9,543.11	9,837.30	
13	Educational Fund - Life Members			51.74	
13	Gustus L. Larson Fund			2,046.49	
13	Research Endowment Fund			807.27	14,063.56
					$653,717.35

LIABILITIES AND NET WORTH

PAGE					
	LIABILITIES				
	GENERAL FUND				
	Society				
	Federal Withholding Taxes		$ 1,956.00		
11	Due to Research General Fund (Per Contra)		19,733.63		
	Sundry Debtors' Credit Balances		668.15		
	Accrued Accounts				
	Salaries	$13,800.00			
	Professional fees	1,750.00			
	Junior Student Member Award	100.00	15,650.00		
	Prepaid Dues and Fees				
	Candidates' Dues	1,436.00			
	Admissions Fees	2,879.32			
	Cash on Deposit (Per Contra)		4,315.32		
	Deferred Income				
	Elected Members' Dues		16,023.09		
	Reserve for Fluctuation-Canadian Exchange		122.71	$ 58,468.90	
	Research				
	Sundry Accounts Payable		117.39		
	Deferred Income				
	Elected Members' Dues	9,846.05			
	Unexpended Earmarked Contributions	2,321.51	12,167.56	12,284.95	
	TOTAL LIABILITIES				$70,753.85
16	NET WORTH				
	GENERAL FUNDS				
	Society - New York		32,063.35		
	Research - Cleveland		67,584.97	99,648.32	
	RESERVE FUNDS				
	Society - New York		139,867.62		
	Research - Cleveland		163,233.31	303,100.93	
	CAPITAL ASSET FUNDS				
	Property Fund		118,682.19		
	Building Fund		39,263.95		
	Building Maintenance Reserve Fund		8,204.55	166,150.69	
	ENDOWMENT FUNDS				
	F. Paul Anderson Award		1,320.76		
	Homer Addams		9,837.30		
	Gustus L. Larson		2,046.49		
	Educational Fund - Life Members		51.74		
	Research Endowment		807.27	14,063.56	
	TOTAL NET WORTH				582,963.50
					$653,717.35

BUSINESS FEATURES AT

CONDENSED COMPARATIVE STATEMENT OF INCOME AND EXPENSES

INCOME	OCTOBER 31, 1957	OCTOBER 31, 1956	INCREASE (DECREASE)
SOCIETY			
Dues	$161,353.67	$148,820.13	$ 12,533.54
Admission Fees	11,555.00	9,741.00	1,814.00
Emblems, Pins, Etc.	1,174.25	961.80	212.45
Publications			
Journal Contract	30,000.00	28,961.70	1,083.30
GUIDE	186,072.14	187,744.02	(1,671.88)
TRANSACTIONS	2,291.65	1,704.20	587.45
Books, Reprints, Codes, Etc.	7,437.98	5,314.72	2,123.26
Membership Roll	6,010.05	3,945.96	2,064.09
Exposition Contribution	132,002.13	-0-	132,002.13
Investments	621.55	664.27	(42.72)
Foreign Exchange	488.34	65.31	423.03
Miscellaneous	627.33	169.90	457.43
RESEARCH			
Dues	99,967.11	79,491.75	20,475.36
Contributions - General	21,913.60	22,079.63	(166.03)
Contributions - Earmarked	80,562.05	106,217.82	(25,655.77)
Interest	900.94	481.35	419.59
U. S. Navy — Bu. Ships	2,721.72	127.50	2,594.22
TOTAL INCOME	745,699.51	596,446.06	149,253.45

EXPENSES			
COMMITTEES AND CHAPTERS	32,120.74	24,595.87	7,524.87
MEETINGS	11,429.22	6,656.99	4,772.23
PUBLICATIONS			
Members' Subscriptions to H.P.A.C.	526.36	3,771.25	(3,244.89)
TRANSACTIONS	26,957.80	27,785.81	(828.01)
Membership Roll, Books, Reprints, Codes, Etc.	13,635.60	6,164.53	7,471.07
GUIDE	100,356.12	102,767.75	(2,411.63)
HEADQUARTERS	233,192.68	173,484.59	59,708.09
RESEARCH			
Promotion — Fund Raising	16,693.67	19,375.65	(2,681.98)
Committee Expenses	3,739.79	3,435.14	304.65
Staff Salaries	107,766.64	107,862.52	(95.88)
Laboratory	27,464.49	25,598.10	1,866.39
Building Operation and Maintenance	11,620.72	11,915.97	(295.25)
Provision for Building Maintenance Reserve	2,000.00	2,000.00	-0-
Cooperative Research	38,661.25	48,000.00	(9,338.75)
	626,165.08	563,414.17	62,750.91
NET OPERATING REVENUES	119,534.43	33,031.89	86,502.54
OTHER DEDUCTIONS			
Provision for Decline in Market Value of Investments	670.29	-0-	670.29
NET EXCESS OF INCOME OVER EXPENSES	$118,864.14	$ 33,031.89	$ 85,832.25

(*Continued from p.* 175)

for 1957 was over $745,000 with more than $261,000 coming from dues, while income from publications was nearly $232,000, and from research contributions was over $106,000. With total expenses of just over $626,000, an operating excess of $118,864.14 was shown. However, it should be noted that there was a contribution of $132,000 from the Exposition, and that without this contribution, expenses would have been $46,000 more than income. He noted that there had been a rise in operational expenses including salaries and administration and in a charge for doubtful collections.

Amendment to Employees Retirement Plan

During the first session of the meeting, President Gordon recognized Walter A. Grant, Syracuse, N. Y., chairman of the Finance Committee, who proposed the following:

RESOLVED that the Society hereby ratifies, confirms and approves in all respects the action of the Council in adopting said First Amendment to the Society's said Employees' Retirement Plan, Agreement and Declaration of Trust.

The resolution was seconded by A. F. Hubbard, Moline, Ill., and was carried by voice vote.

Elections and By-Law Amendments

During the first session of the Annual Meeting, President Gordon announced the appointment of Inspectors of Election. In addition to the balloting for Officers, Council members, and members of the Committee on Research, members had voted on a series of 13 amendments to *Articles II* and *VII* of the By-Laws. Following is the Report of the Inspectors of Election as presented during the second session of the Annual Meeting:

BALLOT	TOTAL
FOR OFFICERS FOR 1958:	
President	
E. R. Queer, University Park, Pa.	2530
First Vice President	
A. J. Hess, Los Angeles, Calif.	2529
Second Vice President	
Walter A. Grant, Syracuse, N. Y.	2526
Treasurer	
J. H. Fox, Toronto, Ont., Canada	2520
MEMBERS OF COUNCIL (*three-year term*)	
F. H. Faust, Montclair, N. J.	2497
Fred Janssen, Denver, Colo.	2502
James W. May, Louisville, Ky.	2491
G. B. Priester, Baltimore, Md.	2494
COMMITTEE ON RESEARCH (*three-year term*)	
P. R. Achenbach, Washington, D. C.	2495
S. F. Gilman, Syracuse, N. Y.	2490
N. B. Hutcheon, Ottawa, Ont., Canada	2492
R. M. Stern, Seattle, Wash.	2492
H. E. Ziel, Detroit, Mich.	2482
TOTAL BALLOTS RECEIVED	2607
TOTAL LEGAL BALLOTS	2542
INVALID BALLOTS	65

Scattering votes: Officers, 5; Members, 7; and Committee on Research, 10.

AMENDMENTS TO BY-LAWS	TOTAL	
	YES	NO
1. Art. II *Sec.* 3 Qualifications	2531	11
2. Art. II *Sec.* 3 (a) Honorary Member	2529	13
3. Art. II *Sec.* 3 (b) Presidential Member	2533	9
4. Art. II *Sec.* 3 (c) Life Member	2535	7
5. Art. II *Sec.* 3 (d) Fellow	2519	23
6. Art. II *Sec.* 3 (e) Member	2531	11
7. Art. II *Sec.* 3 (f) Associate Member	2534	8
8. Art. II *Sec.* 3 (g) Affiliate	2530	12
9. Art. II *Sec.* 3 (h) Student	2534	8
10. Art. II *Sec.* 4 Elections	2531	11
11. Art. II *Sec.* 5 Proposals and Applications	2532	10
12. Art. II *Sec.* 6 Rights and Privileges	2537	5
13. Art. VII *Sec.* 2 Council Committees	2535	7

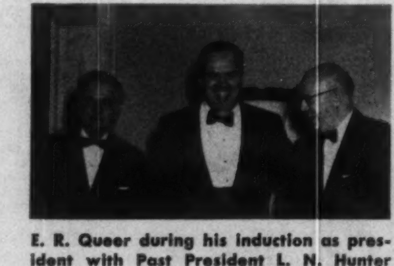
Respectfully submitted,

E. C. HACH, *Chairman*
Pittsburgh, Pa.

J. H. ALLISON
Pittsburgh, Pa.

E. C. SMYERS
Pittsburgh, Pa.

NEWLY ELECTED PRESIDENT AND 1st VICE PRESIDENT



E. R. Queer during his induction as president with Past President L. N. Hunter (center), and Pres. P. B. Gordon

A. J. Hess *(right)* being installed as 1st vice president, with John E. Haines, past president, as installing officer

Resolutions

During the closing (7th) session of the Annual Meeting on January 29th, two Resolutions Committees brought forth a joint report. The deliberations of these committees produced the following resolutions:

Whereas, for sixty-three annual meetings and sixty-two semi-annual meetings your Resolutions Committees have used so many *whereases*, your present *whereas Committee* is herewith abandoning the use of the word *whereas;*

Because, the 64th Annual Meeting of the ASHAE, held in the city of Pittsburgh, whose dreams and schemes come true, is drawing to a close,

Because, the Pittsburgh Chapter and its Committee on Arrangements have provided so well for our comfort and pleasure from the Gay Nineties to the atomic age,

Because, Ted Rockwell, general chairman, isn't as worried as he appears to be,

Because, the arts and sciences of our profession have been advanced by the excellent technical sessions and symposia so well conducted under the direction of the Officers, staff and committees, and

Because we are also tired of the phrase *Be It Resolved,* let it here now

Be Decided, that our congratulations and thanks are due to

The members of our Society honored by the grade of FELLOW — namely, A. L. Baum, the late A. C. Buensod, I. W. Cotton, E. L. Crosby, Prof. F. B. Rowley, E. P. Heckel, Prof. C. F. Kayan and G. M. Simonson,

George L. Tuve, recipient of the F. Paul Anderson Medal,

Linn Helander, honored by the first presentation of the Life Members Club,

Wayne E. Springer, who received the ASHAE-Homer Addams Award,

Ben Gordon and his charming wife, Alice, for being a wonderfully competent presidential team during the past year,

Mayor David L. Lawrence for actually coming to the Welcome Luncheon instead of sending an aide, and for telling us how through civic cooperation such dreams as the Golden Triangle can come true,

Allison R. Maxwell, Jr., whose talk at our Annual Banquet we look forward to with eager anticipation,

The Pittsburgh Chapter, its officers and committees,

R. B. Stanger, honorary chairman, T. F. Rockwell, Jr., general chairman, D. W. Loucks, vice chairman,

Mrs. B. B. Reilly and the ladies of her committee,

The hotel management and staff for taking good care of us (except electronically),

The headquarters staff for its continued efficient handling of all the myriad details involved in our meetings,

To Ben Gordon for appointing not one, but two Resolutions Committees.

Respectfully submitted,
J. W. May — *Chairman* of *one*
Resolutions Committee
C. M. Burnam, Jr. Harry G. Gragg
E. L. Crosby D. Lorne Lindsay

Respectfully submitted,
E. L. Crosby, *Chairman* of the
other Resolutions Committee
C. M. Burnam, Jr. D. Lorne Lindsay
Harry G. Gragg J. W. May

These resolutions were antiphonally presented by the two committee chairmen and, on motion made and seconded, President Gordon declared their adoption.

Reproductions pp. 178-79 by courtesy W. M. Wallace, II, Durham, N.C.

Joint Press Release on Proposed ASHAE-*ASRE* Merger

As a result of actions taken by the Council of ASHAE on January 26th and by *ASRE* Council also on January 26th, a joint statement was released to the press. The full text of the release follows:

Pittsburgh, Penna., January 28, 1958—In a joint statement issued today, the American Society of Heating and Air-Conditioning Engineers (ASHAE), and the *American Society of Refrigerating Engineers (ASRE)*, have unanimously approved further study of a method for merging the two Societies as prepared by the ASHAE-*ASRE* Committee on Cooperation.

The ASHAE and *ASRE* Councils have also approved presenting the report to their memberships through Regional and Sectional meetings during the Spring of 1958.

Both Societies, providing a subsequent committee report is approved by their Councils in June, will present the method of merger to the members attending the 1958 summer meetings, and request approval to submit the proposition for membership vote at the winter meetings of the 2 Societies.

NEW COUNCIL MEMBERS

(l. to r.) Past Presidents John E. Haines, P. B. Gordon, John W. James. New Council Members — Fred Janssen, F. H. Faust, J. W. May, G. B. Priester — and L. N. Hunter, past president

Installation of New Officers and Council Members

Annually, the formal installation of the newly-elected Officers and members of the Council takes place during the Banquet. The four newly-elected Council members: F. H. Faust, Bloomfield, N. J.; Fred Janssen, Denver, Colo.; J. W. May, Louisville, Ky.; and G. B. Priester, Baltimore, Md.; were inducted into their new positions in a single group ceremony. Each of the new Officers: Pres. E. R. Queer, University Park, Pa.; 1st Vice Pres. A. J. Hess, Los Angeles, Calif.; 2nd Vice Pres. Walter A. Grant, Syracuse, N. Y.; and J. H. Fox, Toronto, Ont., Canada, Treasurer-elect were each duly installed by past presidents in accordance with custom; with congratulations and good wishes from the past and retiring Officers; and with sincere expressions of their desire to serve the whole Society in their several offices.

JOURNAL SECTION

Retiring Pres. P. B. Gordon, New York, N. Y., expressed his appreciation to all the Officers, committees and members for their cooperation during the past year, while President Queer asked for the assistance of all as he enters in his new office as president of the Society.

ACTIVITIES OF SOCIETY CHAPTERS

Some of the chapters enjoyed excellent technical talks during recent local meetings and many held Christmas parties in lieu of the regular December meeting. Spring activities already have begun with chapters looking forward to sending members and alternates to the Chapters Regional Committee Meetings scheduled from March through May.

Savannah Chapter Receives Its Charter

The Savannah Chapter, the 71st to be chartered by ASHAE, got off to a good start on January 14th. The Charter Meeting was held that night at the Pirates' House, Savannah, Ga., following a reception and dinner.

Prominent guests at the meeting included P. B. Gordon, New York, N.Y., who was making one of his last chapter visits in his capacity as president of the Society. Mr. Gordon presented the charter to R. L. Reiley, newly elected president, and addressed the chapter on *Our Society, Past, Present and Future.*

As regional director of Region 5, C. B. Gamble, New Orleans, La., conducted the meeting and introduced the guests, among whom were the presidents of other local engineering societies. Mr. Gamble explained the value of the chapter to the member.

In addition to President Reiley, the other officers unanimously elected were: Vice President—S. H. Ball, Jr.; Secretary—R. E. Kinser; Treasurer—E. F. Young; Board of Directors—A. P. Gnann, Jr., and K. R. Goddard.

The new chapter received a gavel as a gift from the next youngest in the Society family, the Long Island Chapter. Mr. Gordon made the gavel presentation and presented the record and minutes books to Secretary Kinser. Responsibility for the preliminary details in arranging the chapter's formation was credited to President Reiley and Secretary Kinser.

P. B. Gordon, president of Society in 1957, with newly elected Savannah Chapter Officers *(l. to r.)* R. E. Kinser, secretary, President Gordon, R. L. Reiley, president, S. H. Ball, Jr., vice president

Technical Talks

Members and guests of the ARIZONA Chapter heard an illustrated talk by Bruce Short of the Magna Copper Co., Superior, Ariz., on *Deep Mine Ventilation.* The proportions of problems and conditions under which ventilation must be handled in deep mines provided an exceptionally interesting discussion. ● ● ● An excellent talk on *Vibration, Shock and Noise Control for Air-Conditioning Equipment,* by D. H. Vance, vice president and executive engineer, The Korfund Co., Inc., Long Island City, N.Y., was enjoyed by members and guests at a BALTIMORE Chapter meeting with a stimulating question period following. ● ● ● The feature of a meeting of EMPIRE STATE CAPITAL Chapter was an address by E. K. Campbell, chairman of the board of E. K. Campbell Co., Kansas City, Mo. Mr. Campbell's talk, *Air Movement in Ventilating and Heating,* emphasized the history of air movement and revealed many little known facts about ventilating. ● ● ● At a meeting of ILLINOIS Chapter a Life Member Certificate was presented to Martin Weil. The presentation was made by Samuel Haas. More than 100 members and 75 guests heard John Aeberly, chief of the Bureau of Heating, Ventilating and Industrial Sanitation, Chicago, Ill., discuss the new Chicago Ventilating Code which has been in the making for the last 2 years. Mr. Aeberly traced the history of the ventilating code back to 1911, commenting that earlier opinions varied tremendously. He also mentioned that industrial hygiene was early recognized as a basic necessity in industry and had been given serious consideration by many committees. E. F. Ford, of the ventilation department, then answered specific questions regarding the ventilating code and its interpretation. ● ● ● John W. James, vice president of research for McDonnell & Miller, Inc., Chicago, Ill., gave a most interesting talk before members and guests of JOHNSTOWN Chapter on *Can We Afford to Heat and Cool Our Schools?* Mr. James pointed out that while air conditioning has been widely accepted by industry and commerce, there are only a dozen or so air-conditioned schools. School builders, he said, have accepted as worthwhile investments increased glass area and better lighting, but have not fully learned the effect of air-conditioning to improve learning efficiency. He emphasized that air conditioning in schools is a matter of current interest among engineers and scientists in educational fields and urged members of the heating and air-conditioning industry to make the merit of their products more widely known and accepted. A question and answer period followed Mr. James' talk. ● ● ● An informative talk on *Neighborhood Conservation in Detroit* was given by L. J. Czarniecki, executive secretary of the Detroit Committee for Neighborhood Conservation, who was coffee speaker at a meeting of MICHIGAN Chapter. A second speaker was Willis Stafford of Detroit Controls Co., who discussed controls for residential heating and air conditioning. ● ● ● The speaker at a meeting of NEBRASKA Chapter was F. H. Bridgers, Bridgers & Paxton, Albuquerque, N.Mex., who discussed *Design and Operation of Solar Heated Office Buildings.* ● ● ● NORTH JERSEY Chapter observed its fifth anniversary in December. A large birthday cake with five candles had the Society emblem and the birth date of the Chapter worked into the decorations. Pres. Martin Christesen offered a toast to the continued good health of the Chapter and cut the birthday cake. A past president's plaque was presented to W. C. Kruse, Jr., following the business session. Miss Beatrice A. Hicks, president and director of the Newark Controls Co., Newark, N.J., gave an interesting talk on the fundamental problems involved in the design of controls to withstand excessive temperature and shock. Miss Hicks listed the various factors affecting the accuracy of controls, such as temperature changes, pressure changes, vibration and acceleration. A question and answer period followed Hicks's talk, and in answer to a question at the end of the program, she discussed briefly her activity in advising girls in the field of education, especially as it related to their study of engineering. • • • A panel discussion on *Matching Oil Burners to Boilers* was the feature of a meeting of ONTARIO Chapter attended by more than 100 members and 28 guests. Moderator of the panel was M. C. Bailey, salesman, C. A. Dunham Co., Ltd., Toronto, Ont., Can. Other members of the panel were: K. B. Martin, sales engineer, Martin Bros., Rexdale, Ont., Can., who spoke on the subject as applied to scotch marine boilers; J. Harman, who discussed the application as applied to fire box boilers, and R. H. Bacon, Ontario manager of Combustion & Power Equipment, Ltd., Toronto, Ont., Can., who spoke on the subject as applied to water tube boilers. A most interesting and instructive question and answer period followed. • • • John Crane, chief engineer, Micromet department, Calgon Co., Inc., Pittsburgh, Pa., discussed *Water Cooling Problems and Method of Treatment* before members of PHILADELPHIA Chapter. • • • A panel discussion entitled *To Improve Architects' and Engineers' Plans and Specifications* was the feature of a WASHINGTON, D.C. Chapter meeting. The panel was composed of B. L. Nye, Jr., of the Technical Bureau, Washington Gas Light Co., Washington, D.C., as moderator, with the rest of the panel consisting of Branch Elam, architect, Elam & Darby, and F. H. Weller, partner, Karsunky, Weller & Gooch, both of Washington, D.C., representing engineers; L. T. Davis, vice president, Standard Engineering Co., Washington, D.C., representing contractors, and W. C. Reamy, partner, Meleney Engineering Co., Washington, D.C., representing suppliers. Each member of the panel discussed problems related to his particular activity. A provocative question and answer period followed. • • • *Humidity, Friend or Foe?* This was the subject of a talk by L. G. Miller, dean emeritus engineering, Michigan State University, East Lansing, Mich., before members and guests at a meeting of the WESTERN MICHIGAN Chapter. Dean Miller's talk covered the application of various types of vapor barriers and the proper means of ventilating residential homes. He also discussed the use of humidifiers and dehumidifiers and the testing that is being done by various institutes in connection with humidity.

Other Chapter Activities

Following a meeting of BATON ROUGE Chapter, members and guests were conducted on a tour through the Baton Rouge General Hospital. The group also visited the polio wing and the equipment room to study the high-pressure cooling system. The operation of the system was explained to the group. • • • An informative talk on *Hospital Operating Room Air Conditioning* was the feature of a meeting of EMPIRE STATE CAPITAL Chapter. The speaker, G. C. Briley, application engineer of York Corp., Rochester, N.Y., touched upon improved efficiency of surgical teams, minimization of explosions and calculating loads and controls. Mr. Briley declared that only 2 percent of all hospitals are fully air conditioned at the present time. He pointed out that some of the lesser known benefits of hospital air conditioning were quicker recovery, less cross-contamination and less noise due to the exclusion of external sounds. A particularly stimulating question and answer period followed Mr. Briley's talk. • • • During a Christmas Dinner Dance of FORT WORTH Chapter, T. B. Romine, Jr., president elect, presented a hat to C. R. Gardner, retiring president in appreciation for his work during the Chapter's first year. • • • *Items of Importance to Contractors and Engineers Regarding Insurance* was the topic of a discussion before members and guests of IOWA Chapter. The speaker, H. J. McGuff, resident manager, Maryland Casualty Co., Baltimore, Md., emphasized the importance of coverage before loss and stated that *Loss Potential* should be examined before purchase of insurance. Mr. McGuff said the trend for higher limits in general liability was justified. An extended question and answer period followed. • • • Hon. C. E. Bennett, U. S. congressman from the third Congressional District, was speaker at a JACKSONVILLE Chapter meeting. Congressman Bennett spoke on the past Congress, current congressional action and items of local, national and international interest. • • • Members and more than 70 guests of KANSAS CITY Chapter heard an interesting address by John Norris, president of Lennox Industries, Inc., on *Residential Air Conditioning*. • • • Twenty-two couples enjoyed the Christmas party held by MISSISSIPPI Chapter in lieu of its regular December meeting. • • • Carl Kloverstrom, president of the Denver Construction League, presented an interesting talk on *Viewpoint of Architects on Heating and Air Conditioning* before members and guests of ROCKY MOUNTAIN Chapter. A lively question and answer session followed. • • • Members and guests of UTAH Chapter recently heard an educational and thought-provoking discussion by Glen Swenson, director of the Utah State Building Board. Mr. Swenson outlined the method of the Building Board for selecting architects and engineers for various projects, as well as the fee for preparing plans and specifications. Interest in Mr. Swenson's talk was so great that he remained for an additional 30 min to answer questions. • • • WESTERN NEW YORK Chapter enjoyed its annual Christmas party with bowling, card games and a buffet supper. Santa Clauses Joseph Davis and D. J. Mahoney distributed gifts.

CANDIDATES FOR MEMBERSHIP

Listed here are the names of 94 men who are candidates for membership or advancement in membership grade.
Members are requested to assume their full share of responsibility of receiving these candidates into membership by advising the Executive Secretary before March 31, 1958, of any whose eligibility for membership is questioned. Unless such objection is made these candidates will be voted upon by the Council.

Note: * *Advancement* † *Reinstatement*

Arizona (*Region* 4)

Blackmore, F. H., Vice Pres., Blackmore Sales Co., Inc., Tucson.

Carver, W. L., Sales Mgr., Unitary Div., Climate Control Co., Phoenix.

Arkansas (*Region* 6)

Wilson, H. F., Engr., Fagan Air Conditioning Co., Little Rock.

California (*Region* 4)

Braun, R. H., Mech. Engr., Donald F. Haines and Assocs., San Francisco.

Leemhuis, L. J., Pres., Airfluor Company of California, Inc., Norwalk.

Colorado (*Region* 3)

Roemer, W. C., Partner, Airflow Engineering Co., Pueblo.

District of Columbia (*Region* 5)

Thoman, P. E., Mech. Engr., General Services Administration, Region 3, Washington.

Florida (*Region* 5)

Mitchell, J. E., Cons. Engr., Coral Gables.

Georgia (*Region* 5)

Nettles, M. C., Owner, Nettles Refrigeration Co., Savannah.

Illinois (*Region* 2)

Coobs, M. E.*, Sales Engr., Johnson Service Co., Chicago.

Despot, D. F., Design Engr., Naess & Murphy, Chicago.

Gupta, H. C., Engr., Skidmore, Owings & Merrill, Chicago.

Long, R. D., Gen. Sales Mgr., American Foundry & Furnace Co., Bloomington.

Schwalb, R. G., Sales Repr., Modern Living Radi-Heat Co., Edwardsville.

Sherman, J. E., Vice Pres., Sherman Plumbing & Heating, Inc., Crystal Lake.

Thompson, E. C.*, Mgr., Product Development, Kewanee Boiler Div., American-Standard, Kewanee.

Iowa (*Region* 3)

Blackburn, R. R., Repr., The Trane Co., Davenport.

Roberts, D. M., Mgr. Plbg. & Htg. Dept., Globe Machinery & Supply Co., Des Moines.

Schloemer, E. J., Mfrs. Repr., Bettendorf.

Kentucky (*Region* 5)

Stark, G. W., Sales Repr., Surface Combustion Corp., Janitrol Div., Louisville.

Louisiana (*Region* 5)

Hargrove, Q. W.†, Cons. Engr., Shreveport.

Heard, B. J., Co-Owner, Heard Plumbing & Heating Contractors, New Orleans.

JOURNAL SECTION

Miller, O. O., Design Engr., H. E. Bovay, Jr., Cons. Engrs., Baton Rouge.

Olivier, B. P., Repr., A. M. Lockett Co., Ltd., New Orleans.

Maine (*Region* 1)

Garmond, J. W., Htg. & Vtg. Engr., Alonzo J. Harriman, Inc., Auburn.

Michigan (*Region* 2)

Kelley, C. W., Engrg. Research Dir., Fenestra, Inc., Detroit.

Missouri (*Region* 3)

Bruns, R. F., Cons. Engr., St. Louis.

Foley, D. E., Engr., Foley Heating & Plumbing, Kansas City.

Nebraska (*Region* 3)

Moyer, S. H., Sales Repr., U. S. Supply Co., Omaha.

Theiss, H. F., Sales Repr., American Radiator and Standard Sanitary Corp., Omaha.

New Jersey (*Region* 1)

Anderson, S. A., Htg. & Cooling Specialist, American-Standard, Newark.

Cosgrave, J. J., Sales Engr., Earle H. Fiigon, Elizabeth.

Flower, H. A., Asst. Vice Pres., Binsky and Snyder, Inc., Plainfield.

McClellan, T. O., Sales Engr., Johnson & Norman, East Orange.

New Mexico (*Region* 6)

Downs, W. R., Vice Pres., Landes, Zachary & Peterson Co. of Texas, Albuquerque.

New York (*Region* 1)

Doerfler, G. H., Prod. Mgr., Fedders-Quigan Corp., Maspeth.

Douglas, W. D., Sales Engr., Tri-State Heating & Ventilating Corp., Farmingdale.

Enright, P. P., Sales Engr., Johnson Service Co., Albany.

Gallagher, J. B., Design Engr., Anderson, Ziegler, O'Neill, Inc., New York.

Hubbard, W. S., Htg. Repr., J. E. Sawyer & Co., Inc., Glens Falls.

Jorgensen, Robert*, Asst. Chief Engr., Buffalo Forge Co., Buffalo.

Levy, Sydney, Cons. Engr., Flushing.

Lockhart, C. W., Sales Mgr., Blower & A-C. Div., Buffalo Forge Co., Buffalo.

Newcomb, D. R.*, Mgr., Fan & A-C. Div., Buffalo Forge Co., Buffalo.

Reinbach, Arthur, Proj. Engr., Seelye, Stevenson, Value & Knecht, New York.

Rettek, Harry, Supt., AKWA plumbing & Heating Co., N. Y.

Seibert, R. H.†, Dist. Sales Mgr., Clarage Fan Co., New York.

Solomon, Milton, Owner, Tri-State Heating & Ventilating Corp., Farmingdale.

Ohio (*Region* 2)

Dougherty, C. B., Jr.*, Sales Engr., Johnson Service Co., Cincinnati.

Eeles, C. C., Mgr., Indus. Sales, The Ohio Fuel Gas Co., Columbus.

Erwin, A. B., Asst. Mgr., Htg & A-C. Dept., Integrity Supply, Columbus.

Kinney, W. R.*, Pres.-Owner, The J. A. Myers Co., Columbus.

Marsh, R. C., Chief Engr., A-C. Div., Robert S. Curl & Assocs., Columbus.

Shuman, S. A., Engr., Julian Speer Co., Columbus.

Oklahoma (*Region* 6)

Ashbrener, A. B., Alco Mechanical Contractors, Design & Installation, Oklahoma City.

Howe, E. M., Pres., Air Engineering, Inc., Oklahoma City.

Keyser, A. M., Vice Pres. & Gen. Mgr., Temtrol, Inc., Okarche.

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New York 13, N. Y.

Miller, K. R., Sales Repr., Owens-Corning Fiberglas Corp., Tulsa.

Penner, F. W., Sales Mgr., U. S. Supply Co., Oklahoma City.

Rice, L. A., Dist. Appl. Engr., Goulds Pumps, Inc., Tulsa.

Webb, Frank, A-C. & Com., Sales Mgr., Oklahoma Natural Gas Co., Oklahoma City.

Pennsylvania (*Region* 1)

Adcock, R. B., Chief Proj. Engr., Jack P. Hartmann, Havertown.

Divine, W. H., Mgr. A-C. Applications, York Corp., York.

Egbert, C. W., Mgr., Applications, York Corp., York.

Lampone, A. N., Engr., A. Ernest D'Ambly, Philadelphia.

Ralph, A. B., Dist. Mgr., Penn Controls, Inc., Pittsburgh.

Smith, J. H., Jr., Sales Engr., John J. Nesbitt Co., Inc., Philadelphia.

Suriani, A. J., Engr., A. Ernest D'Ambly, Philadelphia.

Rhode Island (*Region* 1)

Ring, H. D.*, Chief Engr., Smith-Gibbs Co., Providence.

South Carolina (*Region* 5)

Dukes, W. W., Jr., Pres., Dukes & Dukes, Inc., Orangeburg.

Tennessee (*Region* 5)

Meredith, J. H.*, Vice Pres., Southern Supply Co., Jackson.

Texas (*Region* 6)

Barkley, J. W., Sales Engr., Layton Engineering Co., Tyler.

Hatt, M. E., Engr., Matthews Engineering Co., Dallas.

Kerr, W. M., Owner, Wallace Kerr Co., San Antonio.

Pfeiffer, C. V., Indus. Engr., Central Power & Light Co., Corpus Christi.

Porter, T. B., Jr., Estimator, Porter Plumbing & Heating Co., Austin.

Sladek, K. J., Owner, Austin Insulating Co., Austin.

Utah (*Region* 4)

Folsom, H. A., Br. Mgr., American Blower Div., American-Standard, Salt Lake City.

Irvine, L. K., Cons. Engr., Acoustical Engineers, Salt Lake City.

Virginia (*Region* 5)

Fox, R. F., Sales Engr., Johnson Service Co., Norfolk.

Washington (*Region* 4)

Voelker, L. H., Com. Sales Supvsr., Washington Natural Gas Co., Seattle.

Wisconsin (*Region* 2)

Dries, W. C., Engr., Lofte & Fredericksen, Milwaukee.

Canada (*Region* 7)

Butler, R. B., Secy. & Br. Mgr., Crowther MacKay & Assoc., Ltd., Vancouver, B.C.

Dierks, C. W., Mgr.-Owner, Dierks Agencies, Vancouver, B. C.

Dupuis, R. B., Partner, Douglas, Michalenko & Dupuis, Saskatoon, Sask.

Galbraith, G. H.*, Mgr. & Treas., Cumming Galbraith, Ltd., Calgary, Alta.

Greenwood, G. J., Dist. Mgr., Citadel Heating Products Sales, Ltd., Toronto, Ont.

Lacasse, Yvon, Mech. Draftsman, The Royal Bank of Canada, Montreal, Que.

Mayhew, R. J., Repr., Trane Company of Canada, Ltd., Ottawa, Ont.

Mellett, E. C., Mech. Supt., Canadian Comstock Co., Ltd., Edmonton, Alta.

Rotgaus, L. I., Proj. Engr., Winer & Chazonoff, Inc., Montreal, Que.

Iraq

Abbud, K. A., A-C. Engr., Ministry of Development, Baghdad.

Mexico

Innes, J. C.*, Gen. Mgr., Jorge Innes Co., Mexico, D.F.

Netherlands Antilles

Neumann, Peter, Proj. Engr., N.V. ELGA, Curacao.

OBITUARIES

CARLOS E. BRONSON
Kewanee, Ill.

Carlos E. Bronson, 71, a Life Member of the Society, died at his home in Kewanee, Ill., on January 21st. He had retired a year ago as vice president and chief engineer of the Kewanee Boiler Division, American Radiator and Standard Sanitary Corp. in Kewanee.

Painted Post, N.Y., was his birthplace on December 20, 1886. He was a graduate in mechanical engineering from Cornell University in 1910.

After an apprenticeship period with the Erie Railroad at Hornell, N.Y., he worked briefly for the Illinois Central Railroad, Chicago, Ill., as instructor and investigator, and for the Chicago & Northwestern Railway at Chicago as a draftsman. A forty-two-year association with Kewanee Boiler began in 1913.

An active Society member, Mr. Bronson served on the Committee on Code for Testing Low Pressure Heating Boilers, 1924-25, and on the Technical Advisory Committee on Solid Fuels in 1940. In 1937-38 he was chairman of the Committee on ASHVE Standard Code for Testing Stoker-Fired Steam-Heating Boilers. He was also the author of a paper on *Rating of Heating Boilers by Their Physical Characteristics,* which appeared in the Transactions of the Society.

Additionally, Mr. Bronson was a life member of *ASME* and a member of the *Illinois Society of Professional Engineers*, the *National Society of Professional Engineers* and the *ASME* Boiler Code Committee. He was a former exalted ruler of Kewanee Elks Lodge and a member of the Midland Country Club.

Mr. Bronson is survived by his wife, Elizabeth; a daughter, Carla; three sons, Carlos, Jr., George and Thomas, and eight brothers and sisters.

EDWIN C. HODGE
Fort Worth, Tex.

The Society has received word of the untimely death of a Fort Worth Chapter member, Edwin C. Hodge. He was 36 years of age.

Since 1949, the year he was graduated from A & M College of Texas with a B.S. in mechanical engineering, Mr. Hodge was affiliated with the U. S. Corps of Engineers in Fort Worth, Tex.

His wife, Elaine Marie, survives. They made their home in Fort Worth.

DANIEL H. LEWIS
Detroit, Mich.

Daniel H. Lewis, owner, Lewis Engineering Service, Detroit, Mich., died on December 9, 1957, at the age of 53. He was a member of the Michigan Chapter, having been a Society member since 1944.

Previous to opening his own business as a dealer and contractor in 1940, Mr. Lewis had been employed as a field engineer for Chrysler Airtemp, division of Chrysler Corp., Dayton, Ohio.

Mr. Lewis is survived by his wife, Evelyn; two sons, Thomas and William, and his daughter, Diana.

IN MEMORIAM

Dwight D. Kimball
1874-1958

Dwight D. Kimball, retired consulting engineer who served as president of the Society in 1915, died in his New York apartment on January 11th. Mr. Kimball, who was 83 years old, had been failing in health for some time.

When he retired a few years ago, Mr. Kimball had an outstanding record of engineering accomplishments, such as his work on the heating and ventilating system for Madison Square Garden when it was built in 1925. Others of his projects included the state capitols at Jefferson City, Mo., and Olympia, Wash., and buildings on the Cornell, Princeton and Yale University campuses. His engineering work extended to South America and Europe.

Mr. Kimball, who was born in Dover, N.H., started his lengthy career with the R. D. Kimball Co., Boston, Mass., in 1895. Three decades later he opened his own office as a consulting engineer in New York, N.Y. He entered into partnerships with Messrs. Cucci and Henszey at different intervals in the ensuing years. Besides his business activities, he was a lecturer at Columbia University.

In his fifty years of Society membership, Mr. Kimball generously contributed his time and effort. In 1912-13, just four years after becoming a member, he served on the Board of Governors of the Society. He was elected 2nd vice president for 1914 and president for the following year. In 1914 and 1916 he was a member of the Council, presiding as chairman in 1915. Throughout the years, he served on the Advisory Board.

Mr. Kimball was chairman of the New York Chapter, 1911-12, and later was a member of the Entertainment Committee, New York Chapter, which then acted as host for the Society. His wide range of committee activities included membership on the Schoolroom Ventilation Committee, 1913; Finance Committee (of Council), 1916; Committee on Revision of Constitution, 1922-25, and Committee to Confer with *American Institute of Architects*, 1923-25. In 1923 he was active also on the Committee to Consider the Report of the New York State Commission on Ventilation, and was chairman of the subcommittee on Direct Steam or Hot Water Radiation. His interest in ventilation was exhibited by membership on the Committee to Develop a Ventilation Safety Code under the Procedure of the American Engineering Standards Committee, 1925, and the Committee on Ventilation Standards, 1931-34.

As an author, Mr. Kimball contributed technical papers which appeared in the TRANSACTIONS of the Society. He wrote on Ventilation Problems and was joint author of presentations on the Experimental Laboratory of the New York State Commission on Ventilation and a Description of the First Year's Work, and on The Testing of Atmospheric Conditions and Heating and Ventilating Equipment.

Surviving are his wife, Mrs. Blanche Kimball, and a brother, John V. Kimball.

JAMES GAYNER
San Francisco, Calif.

James Gayner, 62, a consulting engineer, San Francisco, Calif., succumbed to pneumonia on December 2nd. Mr. Gayner, a member of the Society for twenty years, was active early in the history of the Golden Gate Chapter and served as president of the Chapter in 1946.

For many years Mr. Gayner was well known as a consulting engineer in San Francisco. He had started as a tracer for the Pacific Telephone and Telegraph Co. and worked for several years as a mechanical engineer with G. M. Simonson in San Francisco.

He was a member of *ASRE* and the *Consulting Engineers Association of California*. His wife and two sons survive.

LAURENCE K. NELSON
New Orleans, La.

Laurence K. Nelson, 51, an engineer in New Orleans for the past thirty years, died on December 8th in Baptist Hospital. He had been a member of the Society since 1940.

After graduation from Tulane University with a B.E. in mechanical and electrical engineering in 1927, he began a 1-year association with New Orleans Public Service, Inc., as an engineer and draftsman. Transferring to A. M. Lockett & Co., Ltd., he worked finally in general engineering and contracting sales design. In 1939, he joined James M. Todd, consulting engineer, as an associate, and a number of years later branched out on his own. At the time of his death he was affiliated with Frank P. Fischer Engineering Co.

Other societies he held membership in were *ASME*, the *Louisiana Engineering Society* and the Engineers Club of New Orleans.

Survivors include his wife, Gladys; a daughter, Jean; two sons, Eric and Kent, and a sister, Mrs. Miles B. Hutson, all of New Orleans.

JAMES C. NIEMEYER
St. Paul, Minn.

Word has been received by the Society of the recent death of James C. Niemeyer, architect and engineer, St. Paul, Minn. He died at the age of 67 after a short illness.

Mr. Niemeyer, a lifelong resident of St. Paul, was engaged in his own architectural practice there for forty years. He also had served as a city architect. Church and parochial school projects constituted much of his later work.

In 1949, Mr. Niemeyer joined the Society. Additionally, he was an active member of *AIA*, the *Society of American Military Engineers* and Gargoyle Club, and an associate member of the Builders Exchange. He is survived by his wife, and two brothers, Joseph and Henry.

AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS

Headquarters Office
62 Worth St., New York 13, N.Y.
Tel: BArclay 7-6262

(For names of Society Officers see p. 146)

Research Laboratory
7218 Euclid Ave., Cleveland 3, Ohio
Tel: UTah 1-6161

Regional Organization of Society Chapters

Regions Central Comm. W. A. Grant, Chairman	Regional Areas	Chapters Regional Committees		
		Chapter	Member	Alternate
No. 1 **F. H. Faust** **Chairman**	Conn.	Connecticut (New Haven)	Walter Heywood, Jr.	J. D. Pierce
	Del., Maine			
	Mass.	Massachusetts (Boston)	E. L. Blair	R. F. Curry
	Mass.	Western Massachusetts (Springfield)	F. A. Ferraro	C. R. Munn
	N. H.			
	N. J.	North Jersey (Newark)	S. H. Nitzberg	L. G. Huggins
	N. Y.	Central New York (Syracuse)	L. A. Childs	S. F. Gilman
	N. Y.	Empire State Capital (Albany)	H. F. Kruger	R. B. Taylor
	N. Y.	Long Island	H. J. Campbell, Jr.	C. M. Alston
	N. Y.	New York	J. B. Hewett	C. R. Hiers
	N. Y.	Western New York (Buffalo)	C. W. Stone	J. P. Guerra
	Pa.	Philadelphia	E. K. Wagner	C. J. Forve
	Pa.	Pittsburgh	E. H. Riesmeyer, Jr.	E. J. Busch
	Pa.	Johnstown	K. O. Schlentner	J. K. Thornton
	R. I., Vt.			
No. 2 **P. J. Marschall** **Chairman**	Ill.	Illinois (Chicago)	H. E. Anderson	Herbert Kreisman
	Ind.	Indiana (Indianapolis)	A. O. Roche, Jr.	G. W. Vogel
	Mich.	Michigan (Detroit)	D. S. Falk	K. J. Wagoner
	Mich.	Western Michigan (Grand Rapids)	B. J. Walter	R. J. Waalkes
	Ohio	Central Ohio (Columbus)	W. A. Schoonover	T. R. Walker
	Ohio	Cincinnati	T. D. Reiley	C. P. Krantz
	Ohio	Miami Valley (Dayton)	L. P. Brehm	R. B. Walcott
	Ohio	Northern Ohio (Cleveland)	J. L. Frissee	R. A. Urban
	Ohio	Toledo	J. F. Guest	Robert Greenwald
	Wis.	Wisconsin (Milwaukee)	R. D. Rodwell	H. W. Snyder
No. 3 **Fred Janssen** **Chairman**	Colo.	Rocky Mountain (Denver)	A. S. Widdowfield	D. D. Pearsall
	Iowa	Iowa (Des Moines)	R. S. Stover	R. T. Howard, Jr.
	Iowa	Illinois - Iowa (Moline, Ill.)	W. W. Dodge	D. H. Ninow
	Kan.	Kansas (Wichita)	T. L. Roberts	R. F. Jamison
	Minn.	Minnesota (Minneapolis)	F. G. Vogt	J. H. Jester
	Mo.	Kansas City	J. C. Fasnacht	L. A. Heaven
	Mo.	St. Louis	J. J. Blackmore	N. J. Hubbuch
	Mont.			
	Neb.	Nebraska (Omaha)	E. N. Seiler	F. P. Manchester, Jr.
	N. D., S. D., Wyo.			
No. 4 **W. O. Stewart** **Chairman**	Ariz.	Arizona (Phoenix)	E. P. Boothroyd	F. W. Gabbard
	Calif.	Golden Gate (San Francisco)	Herb Duncan	J. I. Sprott
	Calif.	Sacramento Valley (Sacramento)	M. J. Delavan	J. A. White
	Calif.	Southern California (Los Angeles)	W. J. Biggar	A. Z. Levine
	Idaho, Nevada			
	Ore.	Oregon (Portland)	Keith Kruchbeck	W. B. Hayes
	Utah	Utah (Salt Lake City)	L. K. Irvine	C. E. Ferguson
	Wash.	Puget Sound (Seattle)	M. W. McKinstry	H. M. Hendrickson
	Wash.	Inland Empire (Spokane)	R. D. Nevers	J. A. Doyle
No. 5 **J. W. May** **Chairman**	Ala.			
	Fla.	Jacksonville	W. H. Dowling, Jr.	H. A. Holborn
	Ga.	Atlanta	J. S. Edgar	W. P. West
	Ga.	Savannah	R. L. Reilley	S. H. Ball
	Ky.	Bluegrass (Louisville)	O. J. Hill	H. L. Carr
	La.	Delta (New Orleans)	J. H. Maloney	W. B. Moses
	La.	Baton Rouge	A. W. Holland	W. J. Le Blanc
	Md.	Baltimore	R. E. Dressell	F. M. Hewitt
	Miss.	Mississippi (Jackson)	L. H. Smith	R. E. Vernon
	N. C.	Northern Piedmont (Greensboro)	J. E. Hart	G. B. Rottman
	N. C.	Southern Piedmont (Charlotte)	W. P. Wells	J. R. Clark
	S. C.	South Carolina (Columbia)	B. A. Leppard	A. L. Blackstone, Jr.
	Tenn.	Memphis	G. B. Ramsey, Jr.	J. G. Coleman
	Va.	Virginia (Norfolk)	D. L. Gusler	J. A. Hoffman
	D. C.	Washington, D. C.	H. W. Rush	J. W. Morgan
	W. Va			
No. 6 **P. N. Vinther** **Chairman**	Ark.	Arkansas (Little Rock)	J. W. Thompson	W. A. Bullard
	La.	Shreveport	J. S. Malahy, Jr.	F. H. Spaulding, Jr.
	N. Mex.	New Mexico (Albuquerque)	F. H. Bridgers	E. T. Kryfko
	Okla.	Northeastern Oklahoma (Tulsa)	J. E. Tumilty	G. A. McCune
	Okla.	Oklahoma (Oklahoma City)	F. R. Denham	W. R. Johnson
	Texas	Austin	J. L. Rea, Jr.	W. H. Luedecke
	Texas	El Paso	G. H. Jackson	F. A. Huchet, Jr.
	Texas	North Texas (Dallas)	G. H. Meffert	O. H. Mehl
	Texas	South Texas (Houston)	H. D. McMillan	E. B. Appling
	Texas	Southwest Texas (San Antonio)	O. A. Brynie	F. S. Dalton
	Texas	West Texas (Lubbock)	L. F. Davidson	R. A. Mixon
	Texas	Fort Worth	T. B. Romine, Jr.	J. K. Mattox, Jr.
No. 7 **W. G. Hole** **Chairman**	B. C.	British Columbia (Vancouver)	S. W. Welsh	A. C. Martin
	Man.	Manitoba (Winnipeg)	H. F. Randall	A. K. Piercy
	Que.	Montreal	D. J. McIntyre	Arthur de Breyne
	Que.	Châpitre de la Ville de Québec	Jean Veilleux	P. J. Lamarche
	Ont.	Ontario (Toronto)	John Thompson	R. A. Ritchie
	Ont.	Ottawa Valley (Ottawa)	Jacob Klassen	A. H. Hargreaves
	Alta.	Northern Alberta (Edmonton)	R. G. Proudfoot	G. N. Campbell
		Southern Alberta	H. W. Klassen	L. D. Ontonio

Society Organization Personnel

Council and Council Committees, Advisory Board, General and Special Committees: The latest list of the Council and Council Committees, Advisory Board, and General Committees appears in the February 1958 JOURNAL SECTION on page 146

Nominating Committee: This committee's membership is fixed by the By-Laws. The latest listing appears in the February 1958 JOURNAL SECTION on page 146

Society Regional Organization: The 1958 listing of the names of the Regional Directors and of the members of the Chapters Regional Committees appears in this issue (see above).

Research Committees: The research program is under the guidance of the Committee on Research — a General Committee. The Committee on Research appoints Technical Advisory Committees as needed. The 1958 personnel is scheduled to appear in the June 1958 JOURNAL SECTION. The 1957 listing appears in the December 1957 issue on page 160

Society Chapters and Branches: The Society has chartered 72 Chapters, 1 Overseas Branch, and 6 Student Branches. These groups elect their officers and governing boards. A list of the presidents and secretaries appears in the October 1957 JOURNAL SECTION issue on pages 165-166

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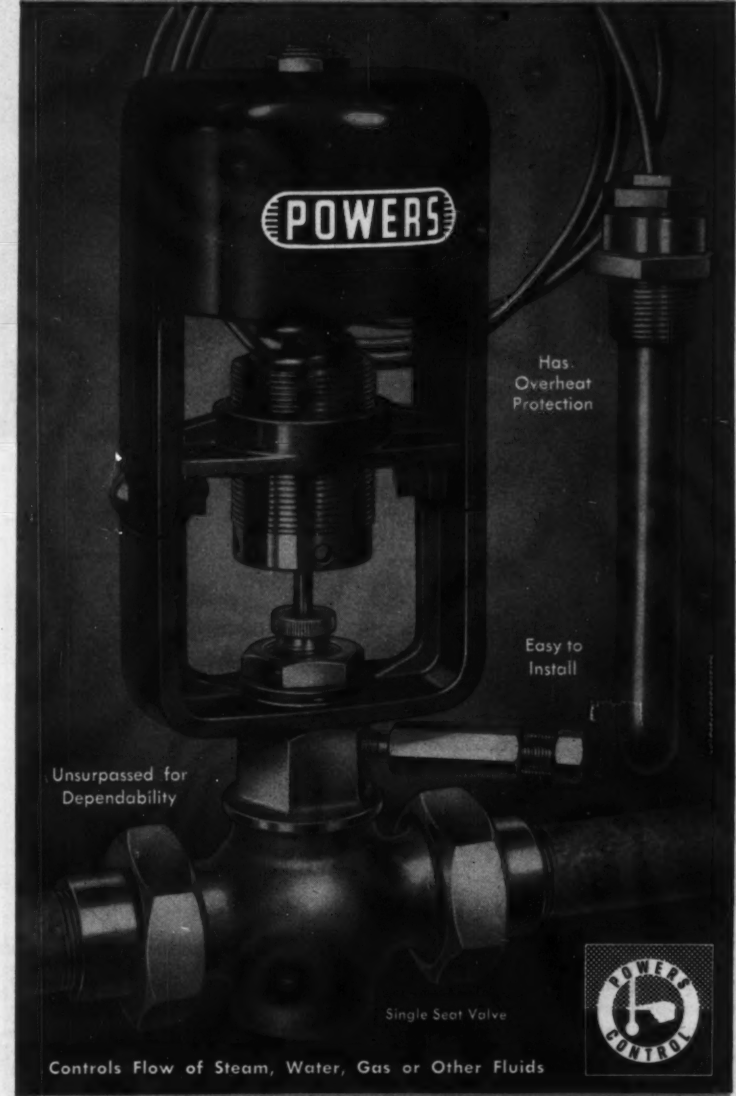
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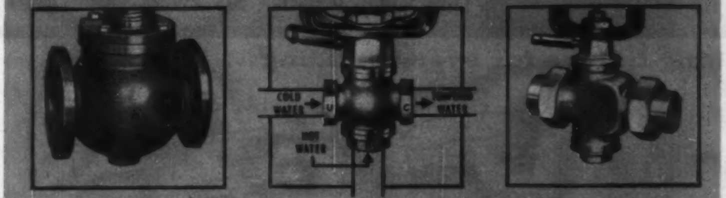
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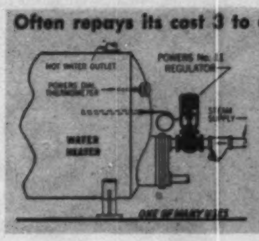
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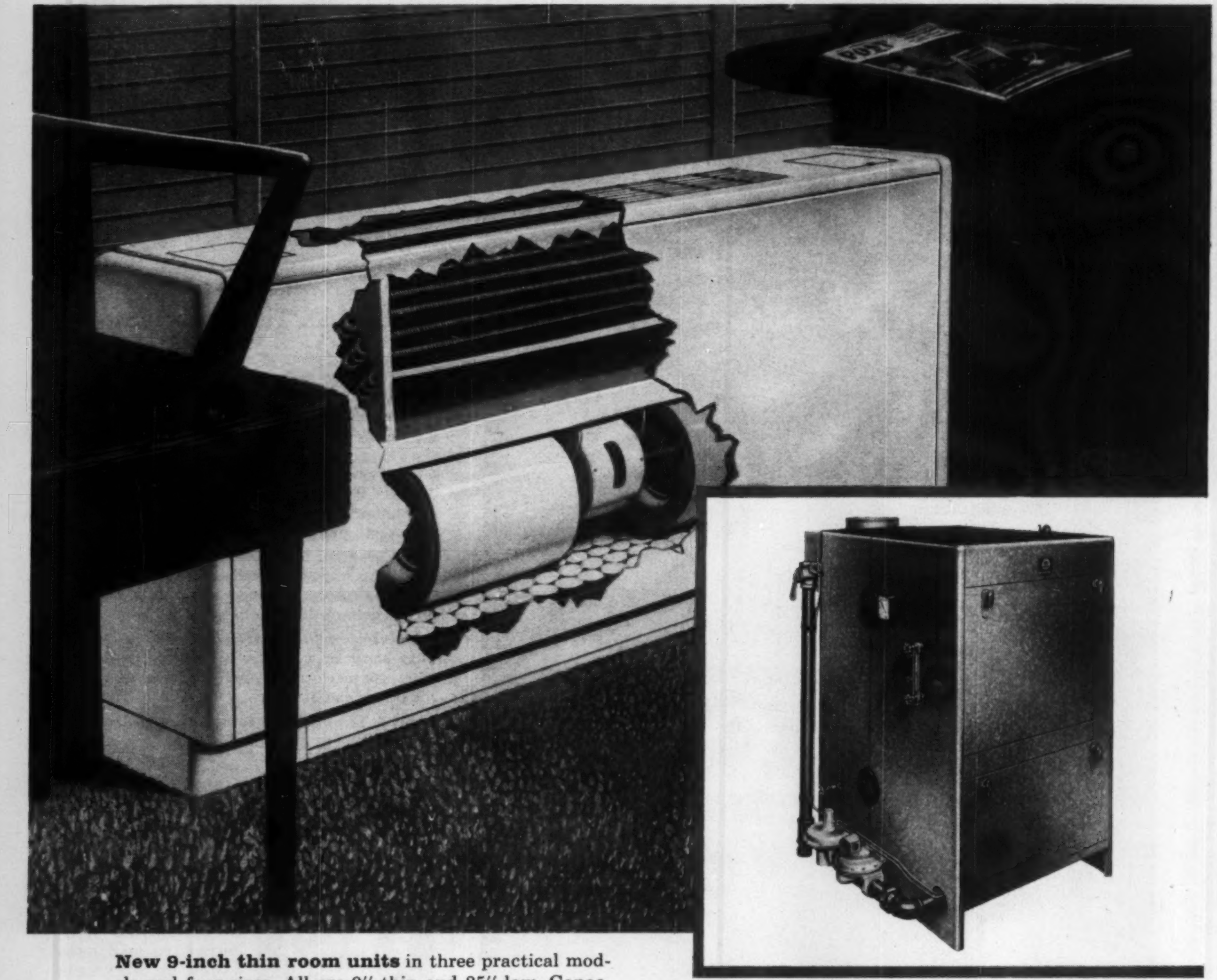

New 9-inch thin room units in three practical models and four sizes. All are 9″ thin and 25″ low. Capacities are test-rated and laboratory-proven. Remotaire units feature exceptional quietness through slow-speed motors (1050 rpm maximum), large coil surface and filter area, heavy insulation and no reactors or autotransformers.

New G-6 Gas Boiler only 65″ high for minimum headroom. Equipped with cast iron base for fast, low-cost installation. Constructed of lifetime cast iron. Ratings approved by I=B=R and boiler approved by A.G.A. Inputs of 650,000 to 5,200,000 Btu per hour. May be installed singly or in battery in large buildings for hot water or steam operation.

American-Standard and "Standard" are trademarks of American Radiator & Standard Sanitary Corporation

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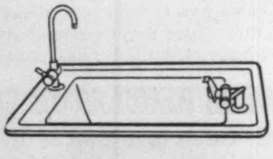
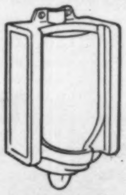
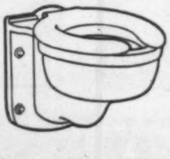


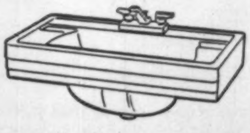
New Ledgeworth cast iron drinking fountain



Casal urinal



Glenco wall-hung toilet



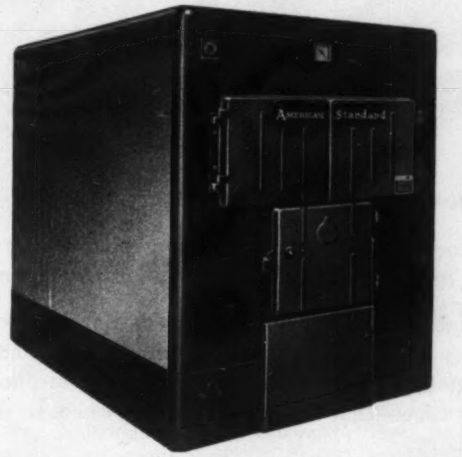
New Buena lavatory

conditioning...test-rated, dependable, flexible

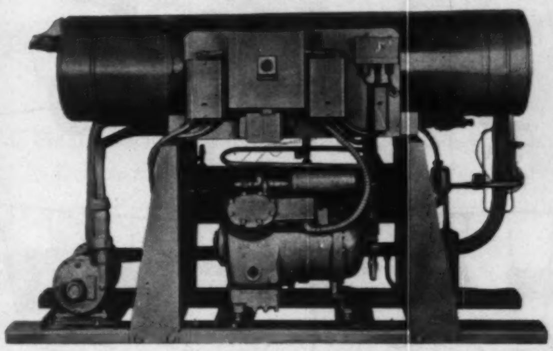
When you specify American-Standard Remotaire air conditioning, you can rely on it for *test-rated capacities, dependable performance, quiet operation, compact styling, sturdy construction, flexible installation, reasonable initial and operating costs.* This modern hydronic* system of hot water heating and chilled water cooling features individual room temperature control and maximum comfort in minimum space. Compact equipment is easy to handle—requires shortest possible installation time.

For more information call your local representative, or write: AMERICAN-STANDARD, PLUMBING AND HEATING DIVISION, 40 W. 40th Street, New York 18, New York.

**Hydronics, the science of heating and cooling with water.*



New A-7 cast iron oil boiler features exclusive new optional steel pedestal that eliminates need for pit or firebrick base. Cast iron sections are factory-tested at 2½ times normal operating pressure with tappings for external domestic water heater. Boiler is designed for oil or stoker firing with gross I=B=R outputs of 866,000 to 2,146,000 Btu per hour.



Packaged Water Chiller is completely factory-assembled, with all circuits piped, wired and tested. Your installation time is cut to minimum, because no field assembly work is needed. Compact, easy-to-handle units are provided with wood skids for fast, safe shipment. Available in complete range of sizes, from 7½ hp to 125 hp; may easily be installed in batteries.

AMERICAN-Standard PRODUCTS

AMERICAN-Standard

PLUMBING AND HEATING DIVISION

"Personally, I always specify Lewin-Mathes Copper Tube"

We welcome stiff-necked specifications.

We meet them . . . because the copper we form into tube is first *refined by us* in our own plant.

We meet them . . . because Lewin-Mathes' *completely integrated operation* permits a standard of quality control—from raw material to packaged tube—that is unsurpassed anywhere in the industry.

As refiners, we know the copper going into Lewin-Mathes Tube is pure. As fabricators, we painstakingly control every physical and chemical property of the finished product. And as *integrated specialists,* we take pride in delivering every foot of Lewin-Mathes Copper Tube uniform and perfect . . . to meet your most exacting requirements.

Nothing primitive about Lewin-Mathes supply facilities. Our products are available through Wholesale Distributors, serviced by Lewin-Mathes Mill Depots throughout 48 states.

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SAINT LOUIS, MISSOURI
COPPER AND BRASS TUBE PIPE AND ROD
DIVISION OF CERRO DE PASCO CORP.

CASE #100—Another case where General Electric Factory-Assembled Air Conditioning Units proved more economical than field-assembled systems.

Architect: [illegible]
General Contractor: James C. Stewart Co.

General Electric Ceiling-Mounted Units at the Dallas Home Furnishings Mart take no floor space—provide individual temperature control (heat and cool)—are metered for zone control of operating cost.

General Electric Zone-by-Zone Air Conditioning in Dallas Home Furnishings Mart permits

INDIVIDUAL CONTROL OF TEMPERATURE—ZONE CONTROL OF OPERATING COST

Air conditioning the vast new Dallas Home Furnishings Mart presented a 3-way challenge. (1) Over 400,000 sq. ft. to be air conditioned. (2) Provision had to be made for each exhibitor to control his own temperature and operating cost. (3) Floor space was at a premium. The ideal solution was found—in the Zone-by-Zone installation of General Electric Ceiling-Mounted Units.

The entire area gets heating and cooling from the same units. Each exhibit area has its own units *individually controlled and metered. No floor space is used.* No ductwork is required. Noise is held to whisper level. And when the Mart proved so successful that Mr. Trammell Crow, owner, decided to double its size, all that was necessary was to add individual units as individual showrooms were added. No fuss—no alterations—no interference with performance of existing units. This is a typical example of how General Electric *factory-assembled* units meet the most exacting air conditioning requirements.

General Electric's complete line is flexible enough to meet every air conditioning requirement for all buildings—large or small—old or new. Ceiling-mounted units water-cooled up to 7½ tons—air-cooled up to 10 tons. Floor-mounted units — water-cooled up to 30 tons—air-cooled up to 20 tons. Steam and hot water coils available for all models. It will pay you to discover how General Electric Factory-Assembled Units can simplify your planning. For full details write: General Electric Company, Commercial and Industrial Air Conditioning Dept., Bloomfield, N. J.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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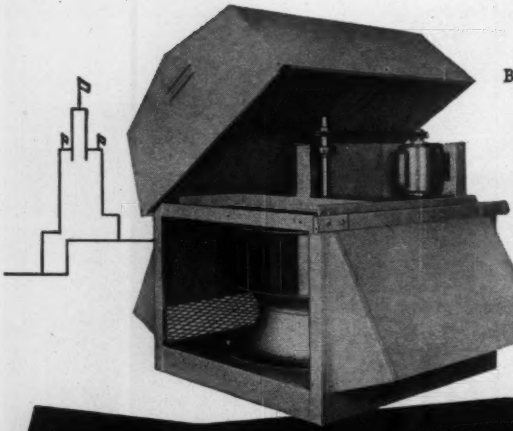
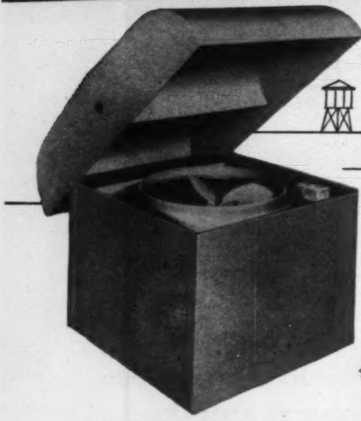


Belt Drive Centrifugal
Roof Ventilator

Recommended for their high quality, ease of installation, low maintenance cost, trouble-free operation, space-saving features, and blower-like performance.

Peerless Electric Roof Ventilators . . .

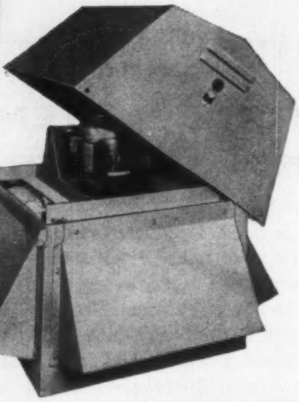


Propeller-Type Power
Roof Ventilator

CERTIFIED RATINGS
AUTHORIZED BY
AMCA

Peerless Electric Roof Ventilators offer engineers, architects, contractors and users AMCA rated units that embody sturdiness, high performance ratings, and low noise levels. They are particularly suited for public buildings, industrial plants, hospitals, churches, schools, and other similar applications.

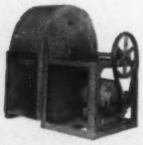
Sizes range from 12" to 60" wheels; 640 to 45,000 c.f.m., depending upon the unit selected. Peerless Electric Roof Ventilators are built of 16 gage steel, or heavier, to last the life of the building. They fit all standard curb sizes. Matching wheel cones accurately fit venturi inlet for quieter operation . . . smoother air movement.

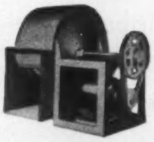


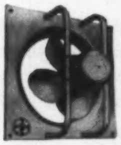
Direct Drive Centrifugal
Roof Ventilator

Write for Complete Line Catalogs

A COMPLETE LINE OF AIR MOVING EQUIPMENT







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Construction Products

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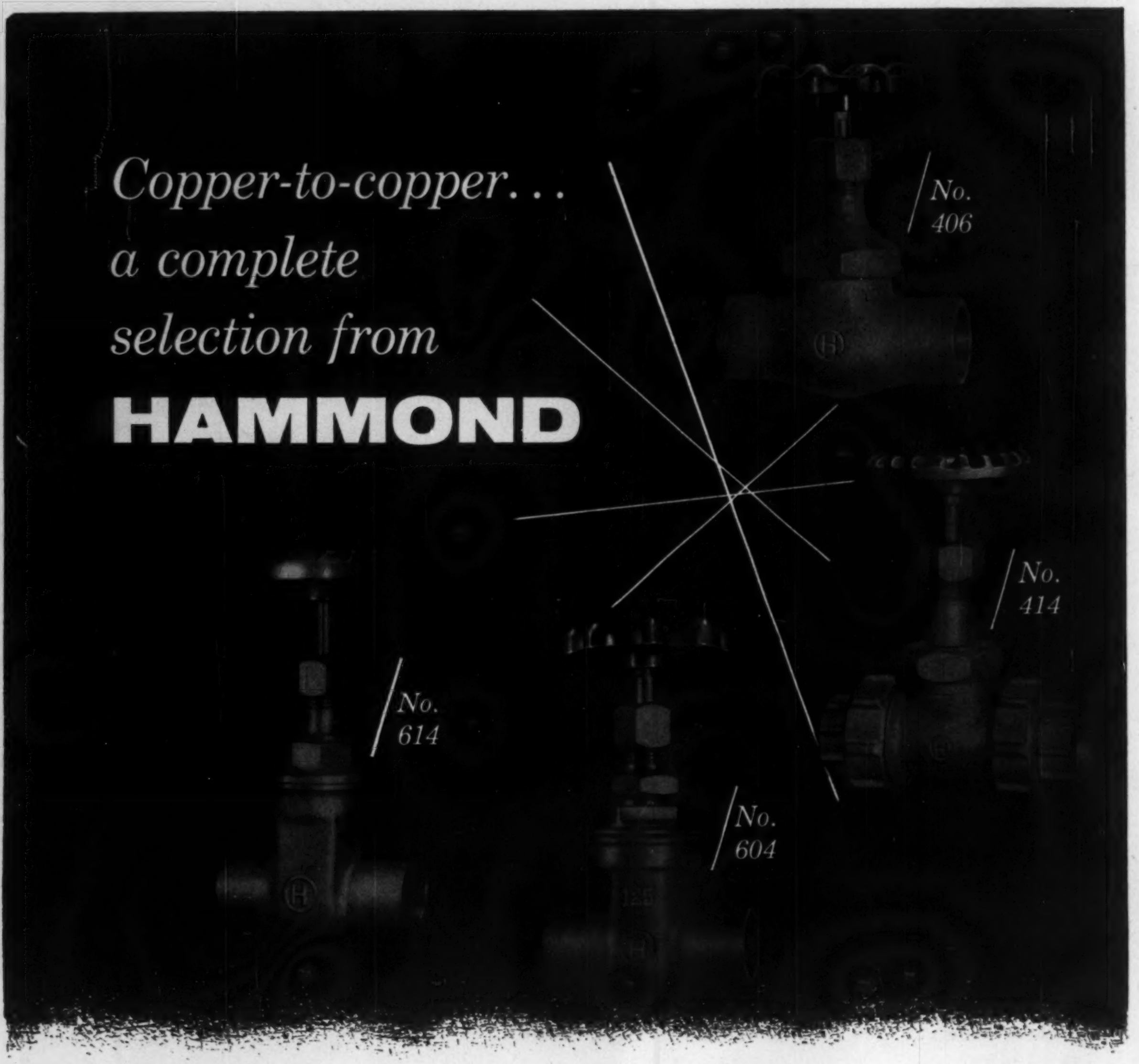


HAMMOND, leader in bronze valves, offers a complete selection of valves with solder ends for copper-to-copper use. All have smooth, clean bores of precise dimensions to assure a permanent, tight seal with copper tubing. Heavy rugged body constructions are designed to take the heat encountered in soldering connections, without any danger of distortion or warping. And this complete copper-to-copper line embodies the quality construction features that have earned HAMMOND's position of leadership in bronze valves for the last 45 years.

A few examples are shown above: No. 604 is a non-rising stem gate valve with a single wedge disc, rated for 125 lbs. No. 406, a compression stop valve for low pressure work, has a renewable disc, screw over bonnet. No. 614 rising stem gate valve has double wedge disc—is rated for 125 lbs. working steam pressure.

For higher temperature applications, HAMMOND presents a selection of socket end valves for silver brazing. For example No. 414 above, especially adapted for marine applications, complies with Bureau of Ships regulations. Its double union ends permit addition of union nut and tail piece for silver brazing. Provided with monel seat, No. 414 is rated for 200 lbs. steam.

Write today for copy of condensed catalog No. 146 which includes description of complete selection of copper-to-copper valves, heating specialties and heavy duty valves—more than 500 separate bronze valves.

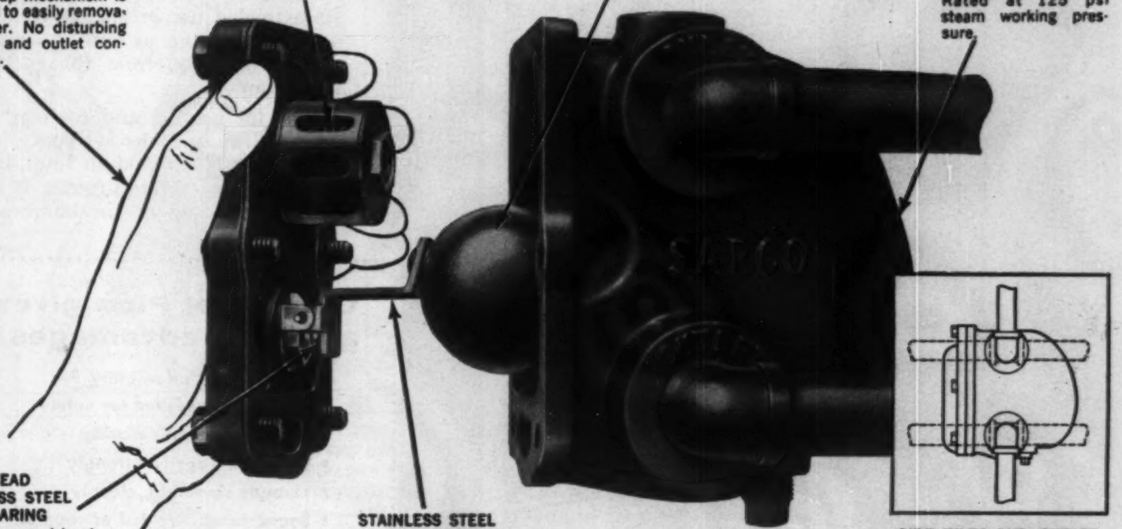
HAMMOND BRASS WORKS, HAMMOND, INDIANA

HAMMOND *BRITE-KOTE*® BRONZE VALVES

Now...more trapping value for your money!

NEW SARCO FLOAT-THERMOSTATIC STEAM TRAP

with improved engineering features



THERMOSTATIC BELLOWS FOR AIR BY-PASS
To insure long life – made of special copper alloy, drawn and corrugated by exclusive process in Sarco's plant.

HEAVY-WALL COPPER FLOAT
Reinforced at lever connection. Copper-plated for greater durability.

EASY ACCESS TO ALL WORKING PARTS
Entire trap mechanism is attached to easily removable cover. No disturbing of inlet and outlet connections.

SEMI-STEEL BODY AND COVER
Rated at 125 psi steam working pressure.

VALVE HEAD STAINLESS STEEL BALL BEARING
Its accuracy and hardness insure tight shut-off, long life.

STAINLESS STEEL VALVE MECHANISM
Valve arm, bracket, seat, ball head – all of stainless steel. Seat is hardened.

SIDE INLET AND OUTLET
Pipe can be connected vertically, horizontally, or at right angles.

This new, improved Sarco Float-Thermostatic Steam Trap Type FT discharges condensate at steam temperature continuously and without shock.

Recommended to drip steam mains, unit heaters, blast coils, heat exchangers, and other allied process equipment, requiring accurate temperature control.

Air Binding Impossible — equipped with separate thermostatic air vent, which removes automatically and immediately all air and incondensable gases reaching trap. Balanced pressure vent self-adjusts to all operating pressures. Its location above condensate level permits discharge of air and gases reaching trap after start-up. Does not require adjustment when pressures change.

Sizes — ¾ and 1″
For steam pressures — 0 to 125 psi

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Thermostatic Steam Traps	Liquid Expansion Steam Traps	Thermo-Dynamic Steam Traps	Float Thermostatic Steam Traps	Camlift Bucket Steam Traps

For FIRST SECURITY . . . The security of *steel pipe* heating *and* cooling!

FIRST
SECURITY

Salt Lake City's new First Security Building is ultra-modern in more than just appearance. It features dual zone air conditioning in which *steel pipe* serves for the steam, chilled water and condenser water lines throughout the 12-floor *heating and cooling* system. Nearly a mile of steel pipe—40,000 pounds— from the basement boiler and chiller installation to the penthouse condensers was required.

Steel pipe is first choice for wet heating . . . proved in almost 70 years of hot water and steam heating applications. Its extended use in modern dual systems for *cooling* as well as heating results, logically, from that acknowledged superiority.

Yes, for heating and cooling, snow melting, fire sprinkler systems, plumbing, power, steam and air lines, irrigation, and structural purposes, it is the most widely used pipe in the world!

Only Steel Pipe gives all these advantages!

- Low cost with durability
- Strength unexcelled for safety
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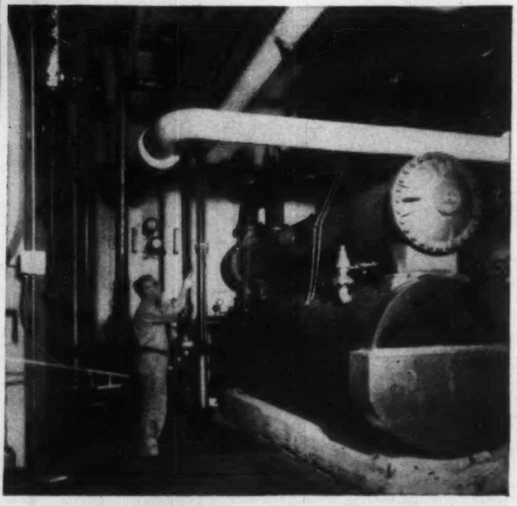
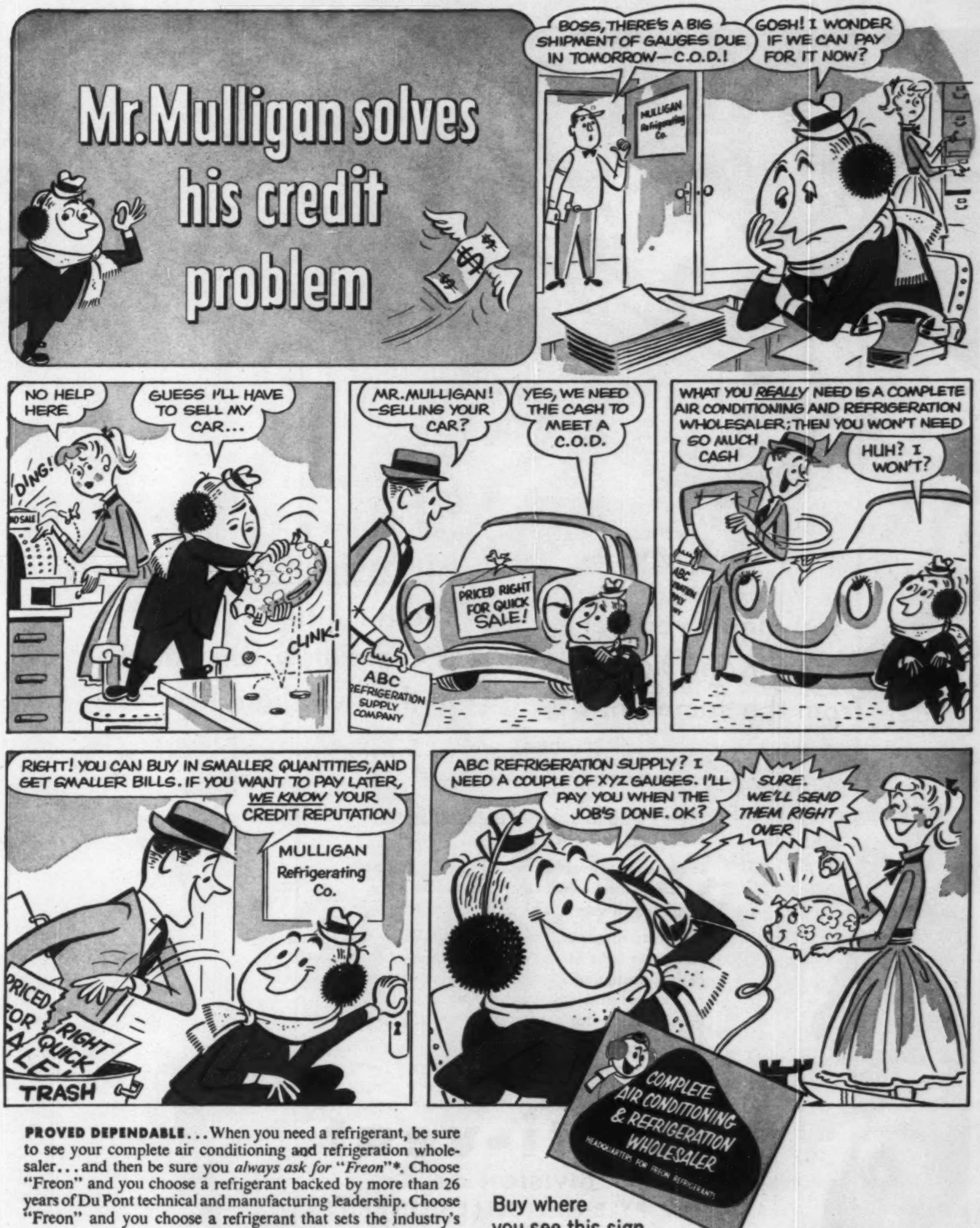
- Weldable—easily, strongly
- Threads smoothly, cleanly
- Sound joints, welded or coupled
- Grades, finishes for all purposes
- Available everywhere from stock



Steam boiler and water chiller equipment for the dual zone air conditioner are compactly housed among this maze of steel piping.

Steel Pipe
is First Choice

Committee on
STEEL PIPE RESEARCH
AMERICAN IRON AND STEEL INSTITUTE
150 East Forty-Second Street, New York 17, N. Y.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GOSH! I WONDER IF WE CAN PAY FOR IT NOW?
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NO HELP HERE
GUESS I'LL HAVE TO SELL MY CAR...
DING!
NO SALE
CLINK!
MR. MULLIGAN! —SELLING YOUR CAR?
YES, WE NEED THE CASH TO MEET A C.O.D.
PRICED RIGHT FOR QUICK SALE!
ABC REFRIGERATION SUPPLY COMPANY
WHAT YOU REALLY NEED IS A COMPLETE AIR CONDITIONING AND REFRIGERATION WHOLESALER; THEN YOU WON'T NEED SO MUCH CASH
HUH? I WON'T?
RIGHT! YOU CAN BUY IN SMALLER QUANTITIES, AND GET SMALLER BILLS. IF YOU WANT TO PAY LATER, WE KNOW YOUR CREDIT REPUTATION
MULLIGAN Refrigerating Co.
PRICED RIGHT FOR QUICK SALE!
TRASH
ABC REFRIGERATION SUPPLY? I NEED A COUPLE OF XYZ GAUGES. I'LL PAY YOU WHEN THE JOB'S DONE. OK?
SURE. WE'LL SEND THEM RIGHT OVER
COMPLETE AIR CONDITIONING & REFRIGERATION WHOLESALER
HEADQUARTERS FOR FREON REFRIGERANTS

PROVED DEPENDABLE... When you need a refrigerant, be sure to see your complete air conditioning and refrigeration wholesaler... and then be sure you *always ask for "Freon"**. Choose "Freon" and you choose a refrigerant backed by more than 26 years of Du Pont technical and manufacturing leadership. Choose "Freon" and you choose a refrigerant that sets the industry's standard for purity and dryness.

Buy where you see this sign...

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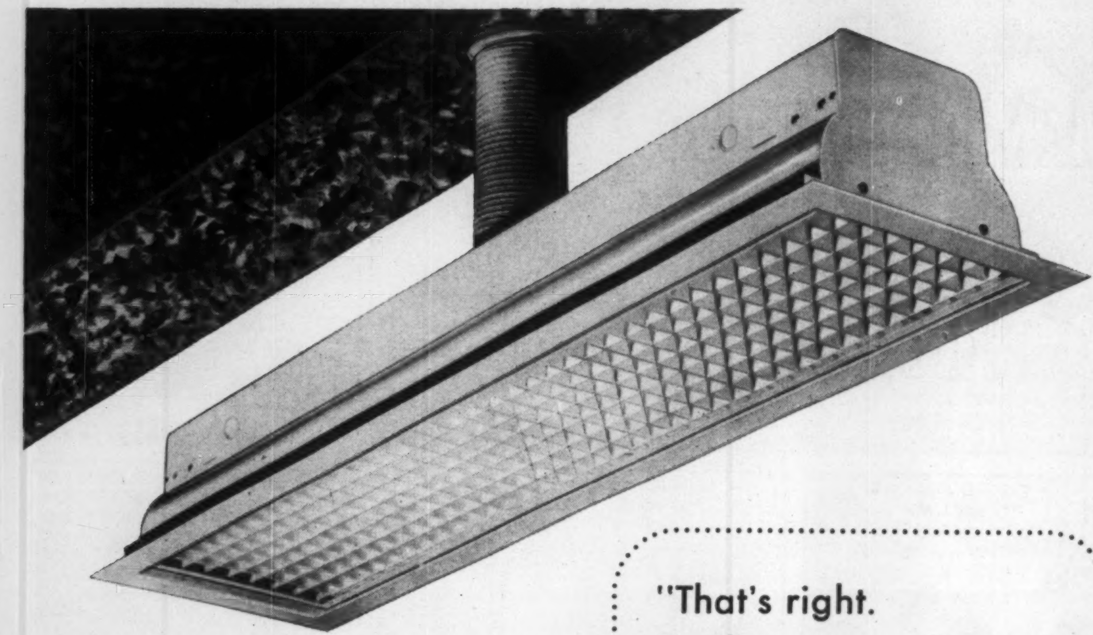

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in the flush light fixture!"

"You mean you get
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Write for detailed literature and the name of the representative in your area.

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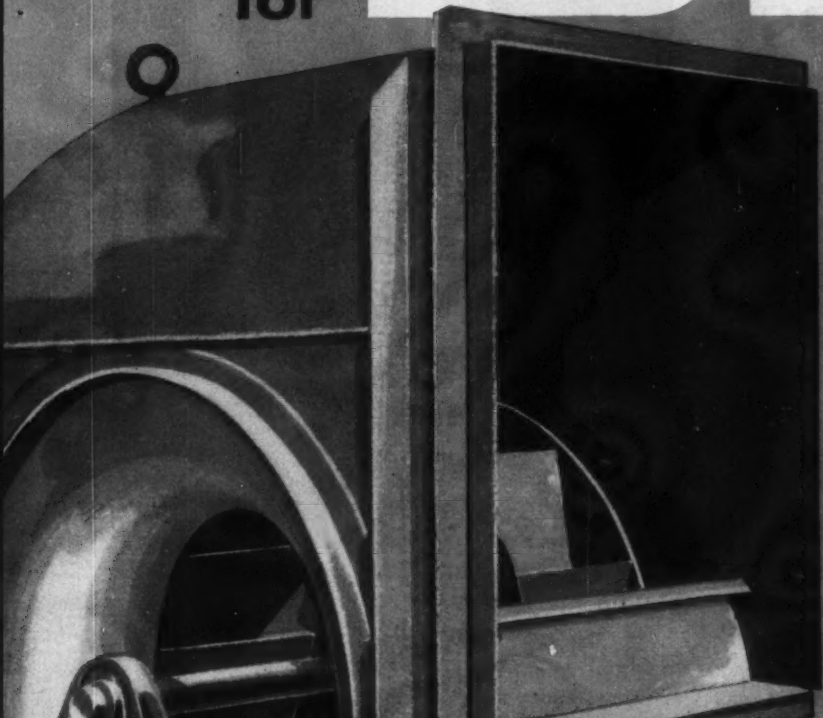

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TRADE FRICK MARK

AT THE

"CROSSROADS OF THE SOUTH"

New Fulton Federal Building in Atlanta uses Frick Air Conditioning throughout.

Half a block from the famous intersection of Peachtree St. at Five Points, in historic Atlanta, is the new home of the Fulton County Federal Savings & Loan Association.

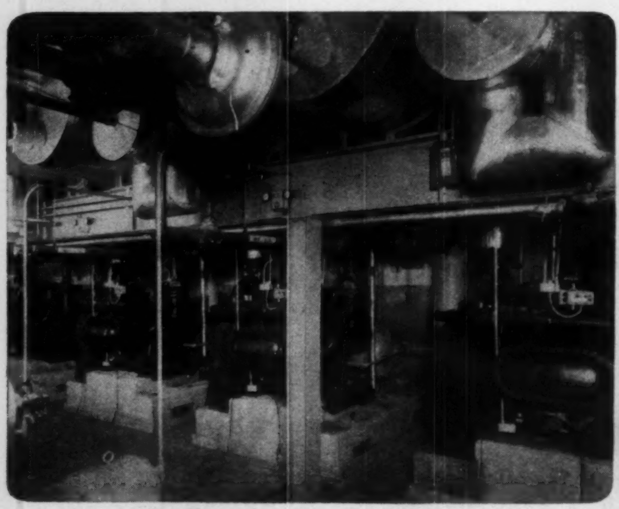
All planning was directed toward achieving the most modern and distinctive bank-office building in the South. Eight different types of domestic and foreign marble were used in the construction. The entire building is equipped with zoned year-around air conditioning.

Five Frick "ECLIPSE" compressors supply the refrigeration for chilling the water for air conditioning. Four of the compressors in a penthouse handle the cooling of the eight top floors, while the other machine, located in the basement, serves the remaining floors. The entire system is fully automatic. Mr. William M. Scurry, President, states, "Since this Frick system has been installed, it has proved highly satisfactory in every respect."

Architects: Abreau and Robeson, Inc., Atlanta, Georgia.

For that all-important air conditioning, ice making, quick freezing or any other refrigeration work of yours, call the nearest Frick representative. Branch Offices and Distributors are located in principal cities the world over. They have the knowledge and equipment to solve all of your cooling problems.

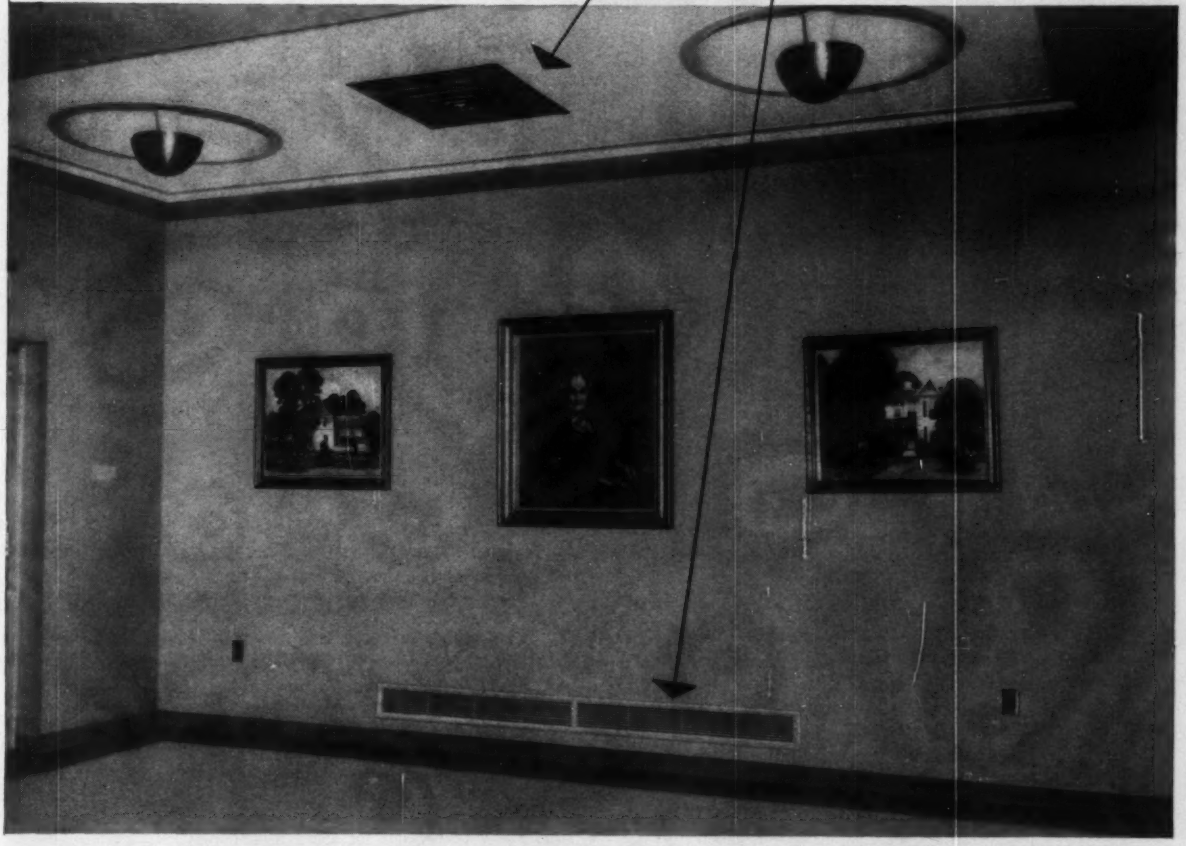
DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA., U. S. A.



Four Compressors Located in Penthouse

Air Conditioned Banking Room in Fulton Federal Savings

Perfect Air Diffusion in the Truman Library with ANEMOSTAT AIR DIFFUSERS *and* WATERLOO GRILLES



Here is a combination—Anemostat Air Diffusers and Waterloo Return Air Grilles—which insures perfect air diffusion in the new Harry S. Truman Library in Independence, Missouri. • Anemostat Type E-1 *Aspirating* Air Diffusers provide true draftless comfort and uniform air distribution in each room of this modern building. Quality-designed Waterloo Grilles act as efficient returns in this system. • Put this performance-proved "team" of Anemostat Air Diffusers and Waterloo Grilles to work in your next heating, ventilating or air conditioning application. They are your assurance of top air diffusion performance.

For complete data on Anemostat Air Diffusers, write for Anemostat Selection Manual No. 60.

For helpful information on Waterloo Registers and Grilles, write for Catalog showing Waterloo's wide range line.

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AVAILABLE NOW! no.3

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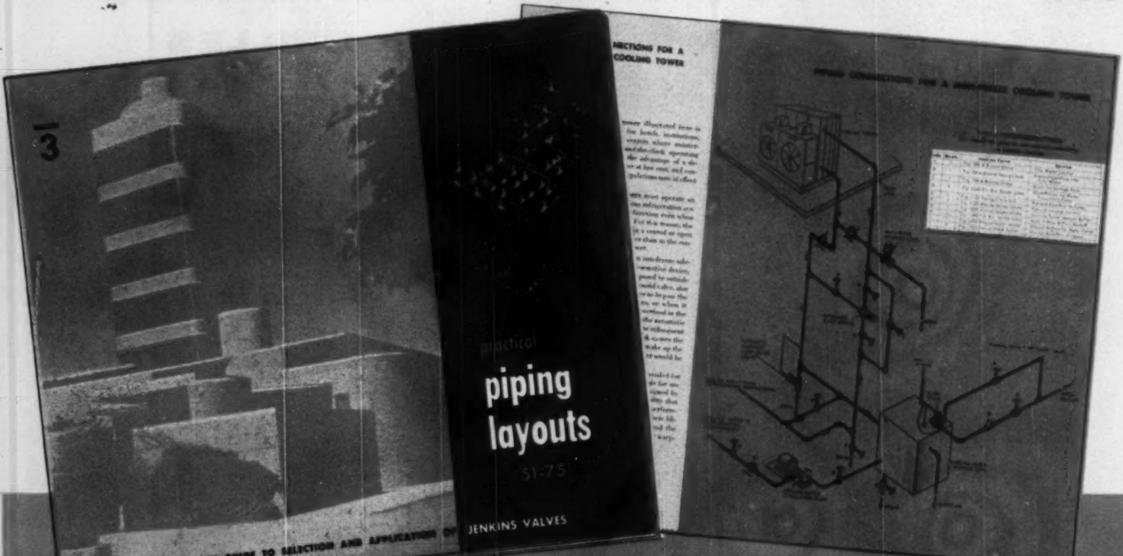
JENKINS PRACTICAL PIPING LAYOUTS Books



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PLUS 10 PAGES OF VALVE SPECIFICATIONS

Volume 3 is a 36-page collection of 25 basic piping diagrams with complete recommendations for valve selection and location in the lines. The material has been prepared by registered consulting engineers in collaboration with the Jenkins Bros. engineering staff and leading equipment manufacturers. It supplements the two booklets released by Jenkins Bros. in past years as a service to consulting engineers, architects, contractors, specification writers and plant operation managers.

In addition to the piping diagrams, this book contains a ten-page, illustrated quick-reference specification "chart" which gives essential data on the complete line of Jenkins Valves.

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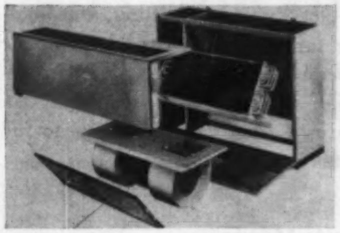
EQUIPMENT DEVELOPMENTS...

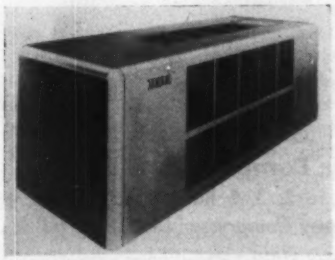
For reviews of Recent Trade Literature see Page 256



Cabinet Heaters . . .

. . . in seven basic unit sizes with 21 hot water, 14 steam ratings — *American Blower, Div. of American-Standard, Dept. HPAC, Detroit* 32.

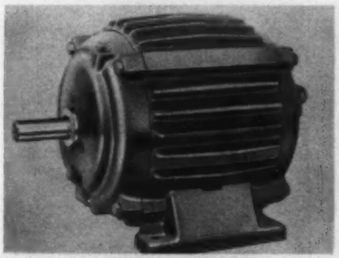
Four sizes in direct-connected, blow-through type, with two forward-curved, double-inlet aluminum blower wheels mounted on double-extended motor shaft. Three sizes in draw-through type, with three, four, or five forward-curved, double-inlet aluminum blower wheels on common shaft. Special equipment available; special installations possible, says company.



Room Induction Unit . . .

...for institutional, skyscraper, multistory office and apartment buildings — *Trane Co., Dept. HPAC, La Crosse, Wis.*

Four new models are: (1) 12 in. vertical cabinet for installation beneath low sills; (2) 12 in. vertical unit for concealed installation at floor level; (3) 10 in deep horizontal cabinet for ceiling installation; (4) 10 in. horizontal unit for concealed installation above ceilings. All used for perimeter air conditioning in high velocity induction central systems. Capacities range 2000 to 12,000 Btu per hr. Reversible coils are one row deep in direction of air flow with 144 aluminum fins per ft, company says.



Fan-Airover Motor . . .

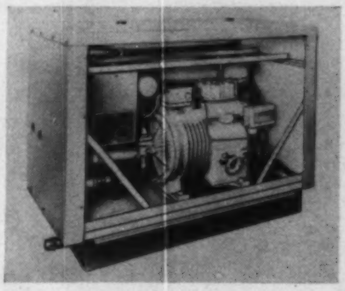
... developed for use on applications in which it will be placed in airstream of driven fan — *U. S. Electrical Motors, Inc., Dept. HPAC, Box* 2058 *Terminal Annex, Los Angeles* 54.

Totally enclosed "JN" motor available in sizes 1 to 15 hp. Because motor is cooled by fan it powers, motor and fan guard are eliminated. Ball bearings with transverse lubrication, asbestos-protected windings, cast iron construction, rounded cooling ribs, normalized castings cited as features by manufacturer.

Packaged Chiller . . .

... in three sizes from 3 to 7½ hp — *Embassy Steel Products, Inc., Dept. HPAC,* 890 *Stanley Ave., Brooklyn* 8.

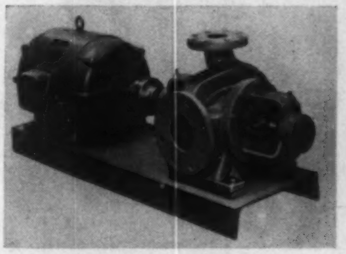
Models "EWC-30, EWC-50, EWC-75" designed for small commercial cooling, industrial processing and air conditioning applications. Chiller is fully cork insulated, and semi-cleanable, with detachable head on water inlet side. Test cocks provide check on refrigerant level. Compressor has semi-hermetic motor assembly, direct connected; is spring mounted.



4-D Wrought Iron . . .

... designed to resist corrosive forces — *A. M. Byers Co., Dept. HPAC, Clark Bldg., Pittsburgh* 22.

By increasing deoxidation of base metal, relative phosphorous content, using 250,000 silicate fibers through each sq in., corrosive resistance improved against severe industrial atmospheres, acid solutions, salt water, steam condensates, others. Has greater uniformity, improved physical and mechanical properties, says company.

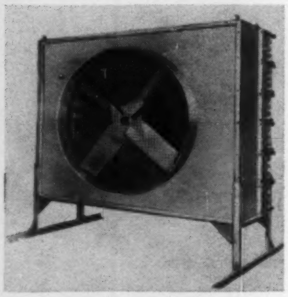


Boiler Feed Pump . . .

... designed for extra long service life — *Fred H. Schaub Engineering Co., Dept. HPAC,* 2110 *S. Marshall Blvd., Chicago* 23.

Turbine type, 1750 rpm, two-stage, center mounted unit has capacities to 150 gpm, pressures to 300 psig.

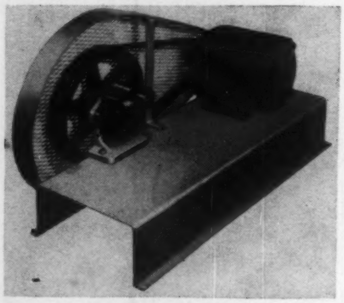
"Durahard" electrolized impellers with surface hardness of 1100 Brinnell are mounted. Design permits "pulling" shaft seals from end of shaft through bearing aperture without dismantling pump.



Air Cooled Condenser . . .

. . . with 50 ton capacity — *McQuay, Inc., Dept. HPAC,* 1600 *Broadway, N. E., Minneapolis* 13.

New "AB" model is belt driven, remote, designed for waterless refrigeration and air conditioning; has single fan, motor assembly. Two types available: 2, 3, 5 ton nominal capacity direct drive models for commercial, industrial application; belt driven models in sizes 9, 11, 15, 20, 25, 30, 40, 50 ton nominal capacity in single units for larger condensing requirements. Coils constructed of copper tubes.



Heavy Oil Pump . . .

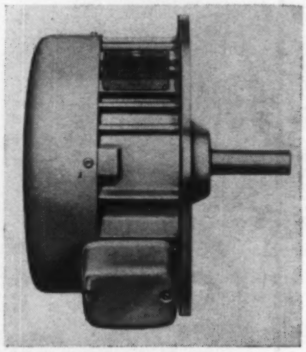
. . . equipment in complete sets with direct drive or belt drive units — *Webster Electric Co., Dept. HPAC, Racine, Wis.*

Pumps have capacity ranges from 28 to 575 gph, with pressures from zero to 300 psi; motors range from ¼ to 2 hp, at 900 rpm. Capacities, pressures of belt driven sets varied to meet requirements by changing of pulley sizes.

Solenoid Valve . . .

. . . for use on air, water, oil — *Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Dept. HPAC, Box* 400, *Knoxville* 1, *Tenn.*

Flow of new valve is straight through solenoid armature housing. Feature said to helpful in meeting strict space requirements of applications in many types of commercial equipment. Miniature valve—measuring about 2 in.—is resistant to moisture, suitable for use with edibles, corrosive materials, company says.



Pancake Motor . . .

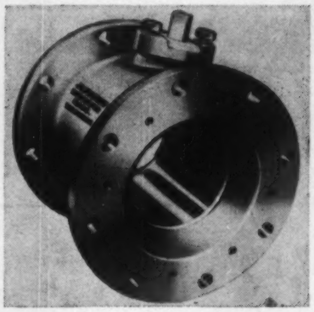
. . . with length reduced up to 60 percent — *Louis Allis Co., Dept. HPAC,* 427 *E. Stewart St., Milwaukee* 1.

Flange type motor of conventional radial air-gap design intended for use on machine tools, roof ventilating fans, other cramped installations. Available 1 to 15 hp at 1800, 1200, 900 rpm. Built in open dripproof enclosure; enclosed construction available for special conditions.

Ball Valves . . .

. . . in 6, 8 in. sizes — *Jamesbury Corp., Dept. HPAC,* 45 *New St., Worcester, Mass.*

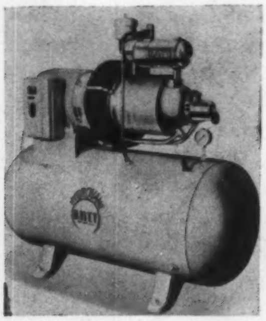
"Double Seal" line available in stainless steel, carbon steel, bronze, aluminum; seats and seals in teflon, synthetic rubber to suit requirements. "Unit body" construction eliminates need for exterior bonnet joint and gasket, says manufacturer. One-quarter turn shutoff is hand lever or air operated. Seats and seals interchangeable; no lubrication required. Can be used from vacuum service to full rated pressure.



Unit Heaters . . .

. . . for commercial, industrial, public buildings — *Campbell Heating Co., Dept. HPAC,* 3121 *Dean Ave., Des Moines* 17, *Iowa.*

New gas, oil fired heater available in two different assemblies known as "Hi-Boy" and "Horizontal" units. Twelve models range in capacities 225,000 to 1,500,000 Btu.



Air Compressors . . .

. . . in 2, 3, 5 horsepower models — *Davey Compressor Co., Dept. HPAC, Kent, Ohio.*

Units operate at 100, 200 psi; recommended for general industrial applications. Features cited include freedom from vibration, quietness of operation, compactness.

Hot Gas Washer . . .

. . . available as package unit — *Lehigh Fan & Blower Div., Fuller Co., Dept. HPAC, Catasauqua, Pa.*

New unit designed to eliminate

THE MARK OF QUALITY

BARBER
COLMAN

Electrionic Control APPLICATIONS

NOW, BETTER CONTROL OF NEW FACE AND BYPASS UNIT VENTILATORS with modern electrionic controls

New control package from Barber-Colman enables you to take maximum advantage of the new face and bypass unit ventilators. Applicable to both year-round air conditioning and heating-only units.

SIMPLIFIED CONTROL PACKAGE

The new system consists of a motor operator, a dual element controller, plus an automatic change-over thermostat on year-round systems. Outdoor reset of supply water temperature and design of unit ventilator eliminate need for supply valve. Unit controls use electric power provided at fan motor. Factory installation may be specified.

UNIT-MOUNTED THERMOSTAT

Dual-element thermostat mounted within the unit ventilator eliminates wall-placement problems, chalk dust and dirt problems, and tampering by unauthorized personnel. Discharge temperature maintained within comfortable limits at all times through anticipating action of room and discharge controller.

POSITIVE POSITIONING MOTOR OPERATOR

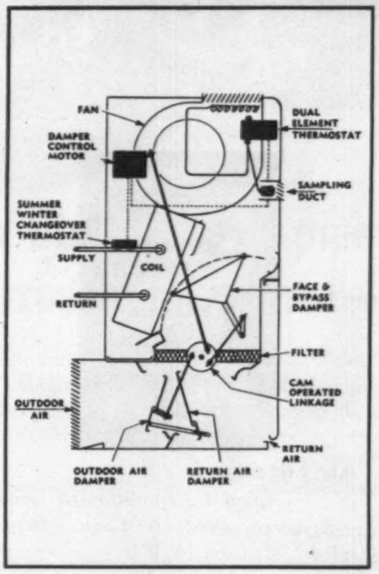
Positive-positioning provides full power to position outdoor and return air and face and bypass dampers as required by room air controller. Motor position is determined by electric feed-back circuit and is independent of connected load imposed by dampers and linkage. Spring return insures positive closing of outdoor air damper on fan shut-down.

CHANGE-OVER THERMOSTAT

Change-over from heating to cooling is automatic. Thermostat senses hot or chilled water supply medium and activates control system accordingly.

APPLICATION FLEXIBILITY

Adjustable minimum outdoor air meets all codes. Night control optional.



BETTER CONTROL . . . ELECTRIONICALLY

No increase in cost over other control systems — substantially lower costs reported on many installations. Controls and unit ventilator powered from same source.

BACKED BY BARBER-COLMAN

Local Barber-Colman comfort engineers assume complete responsibility for adjustment and performance of controls wherever ventilators are installed, even when controls are factory-mounted by the unit ventilator manufacturer.

COMPARE AND SPECIFY

Bulletin F 8527 gives full details, including control sequence, possible variations, and how to specify. Call your Barber-Colman comfort engineer or clip this ad to your letterhead and mail direct to Barber-Colman Company.

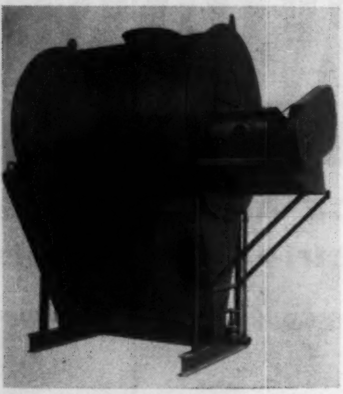
BARBER-COLMAN COMPANY

Dept. C, 1301 Rock Street, Rockford, Illinois • Field Offices in principal cities

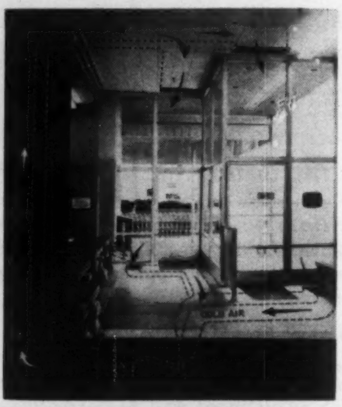
Automatic Controls • Air Distribution Products • Small Motors • Industrial Instruments • Aircraft Controls • Electrical Components • Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

EQUIPMENT DEVELOPMENTS

Continued



most air pollution problems, resist temperatures up to 2000 F. Washer is 15 ft high, with large access doors. Can be used for incinerators, melting furnaces, chemical processes, other conditions where hot air or gases present dust pollution problem.



Door Heating System . . .

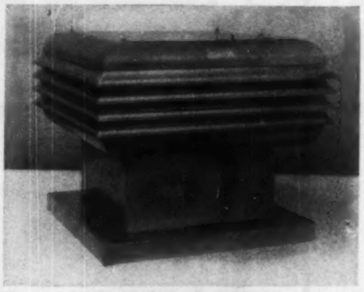
. . . for eliminating cold drafts where doors open and close frequently — *Dunham-Bush, Inc., Dept. HPAC, West Hartford, Conn.*

"HU" units supply air through duct to grille above door; "blanket" door opening with heated air; air is pulled back to unit from floor grilles located in building on both sides of entrance, according to manufacturer.

Liquid Level Alarms . . .

. . . designed to monitor any process or plant variable — *Electro Devices, Inc., Dept. HPAC,* 116 *S. Michigan Ave., Chicago* 3.

Additional mercury switches combined with mechanical tripping latch action allow alarm units to be used directly in control, company says. Now included are individual pullout units which—when disengaged—isolate external sensing contacts simplifying process of checking for grounds, according to manufacturer.



Power Roof Exhauster . . .

. . . designed for 300 to 27,000 cfm range — *Greenheck Fan & Ventilator Corp., Dept. HPAC, Schofield, Wis.*

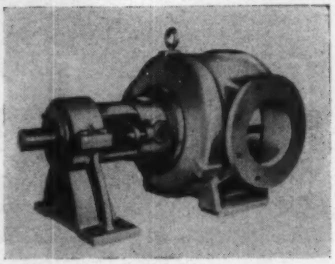
Base curb rings of "Wausau Air Mover" made of steel, louver fins made of aluminum. Sealed ball bearings used to mount nonoverloading, backward curved centrifugal wheel; ball bearing motors mounted out of air stream adjust to control pulley belt tension. Vibration mountings isolate motor, fan from base.

RP
EZ KLEEN
FILTER

Air Filter . . .

. . . for room air conditioning units —*Research Products Corp., Dept. HPAC, Madison* 10, *Wis.*

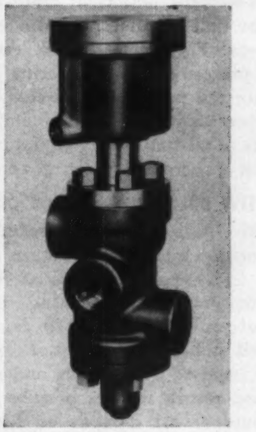
New aluminum units furnished in 15 × 24 in. size; can be easily cut with scissors or knife to desired size to fit variety of room air conditioners, company says. Other features cited: rigid construction holds shape; washable with water; offers odor removal.



Rotary Pump . . .

. . . for viscous and thin liquids — *Seren Machine Products Corp., Dept. HPAC,* 1800 *W. Fulton St., Chicago* 12.

Unit designed for high efficiency in capacity range to 1200 gpm for general transfer, metering, other services involving pressures to 100 psi. Minimum sealing surfaces with optimum rotor, idler dimensions for any given viscosity reduce viscous drag with resultant efficiencies as high as 90 percent, company says. Direction of flow may be reversed regardless of shaft rotation. Available in various materials for handling variety of liquids.



Hydraulic Valves . . .

. . . in new line of 600 to 4000 psi cylinder operated units — *Sinclair-Collins Valve Co., Dept. HPAC,* 454 *Morgan Ave., Akron* 11.

Double acting cylinder for valve operation is said to reduce valve mounting space and increase response by pressure actuation in both directions. Operating pressure is 60 to 140 psi, using air, water, or oil. Adaptable for NO or NC operation, new valves especially suitable for control of water, glycol or oil base hydraulic

(Continued on page 208)

USCOFLOW PLASTIC PIPE

Mr. Usco shows:
How to handle
CORROSION
and stay in the
BLACK!

New black UscoFlow Utility plastic pipe and fittings provide economical corrosion resistance—inside and out

A blend of styrene-base resins and synthetic rubber to give good impact resistance and high, effective tensile strength...

A simple installation—rapidly solvent welded...

A friction-free finish that maintains high flow-rate and resists build-up of scale or other deposits...

An economical price to solve corrosion and high installation cost problems that would ordinarily chew into your profits...

All this is the *new* UscoFlow line of black plastic pipe and fittings, specially designed for economical and efficient handling of fluids. It has already proven its long service life, free of maintenance and downtime, and is recommended for such applications as

salt-water lines **fresh-water lines***
natural-gas lines **electrical conduit**

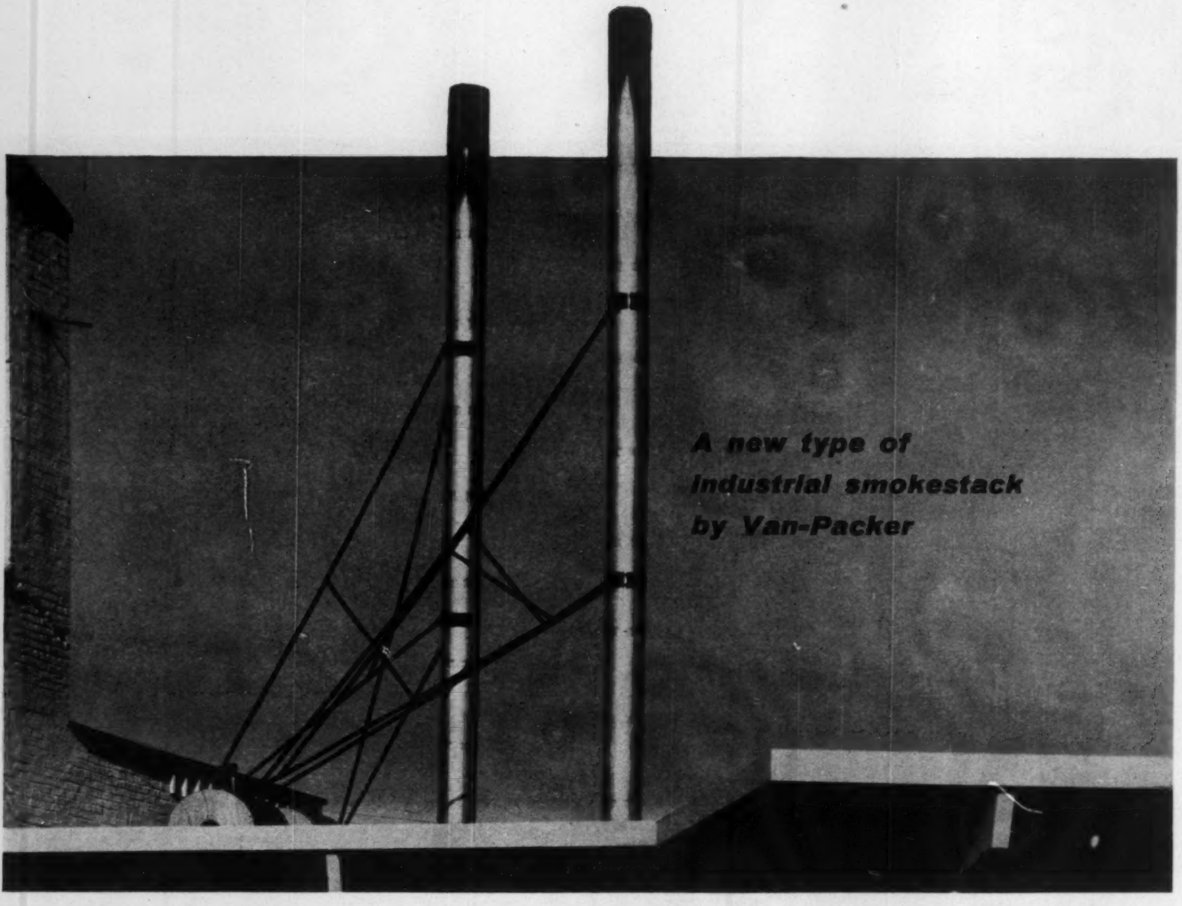
A full selection of UscoFlow pipe and fittings—plus expert engineering assistance—is available at any of the selected "U. S." Distributors, at "U. S." Branch Offices, or by contacting us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

**Uscolite is approved by the National Sanitation Foundation for use with potable water.*

Mechanical Goods Division

United States Rubber

See things you never saw before. Visit U. S. Rubber's new Exhibit Hall, Rockefeller Center, N. Y.



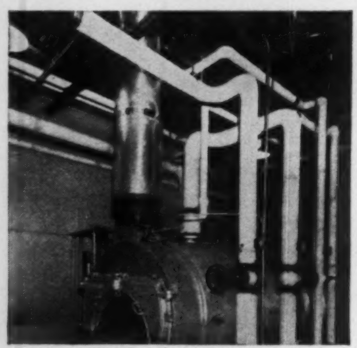
Get longer stack life at lower cost

Permanent construction — Because the Van-Packer is made of non-corroding refractory material it will outlast a steel stack as much as three times. The aluminum jacket which encases each stack section eliminates maintenance.

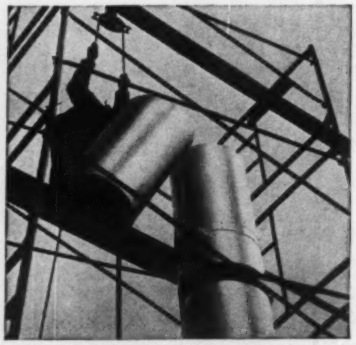
Low Cost — The Van-Packer costs no more than a steel stack, and only 1/3 as much as brick. Other savings result from fast installation, savings on maintenance, and long life. Handles all fuels for boilers, furnaces, incinerators.

Prefabricated refractory sections—Centrifugally-cast 3-foot sections combine the economy of a steel stack with the permanence and high draft of a brick stack. Seven diameters from 10-inch ID to 30-inch ID.

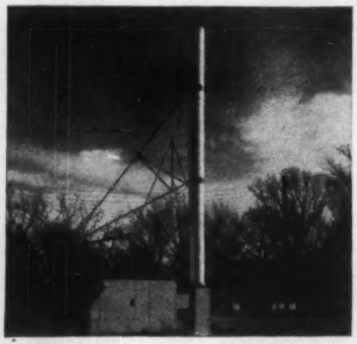
Available nationwide — Van-Packer Stack is available through local Van-Packer Jobbers and Special Representatives. See "Chimneys — Prefabricated" in Yellow Pages, or write Van-Packer for Bulletin IS-32-57.



Van-Packer Stack with Standard Sections handles boilers and furnaces efficiently. Can be superimposed or floor supported.



Installing this stack is quick and easy. Three-foot sections are simply cemented atop one another with acid-proof cement.



Van-Packer Hi-Temp Stack handles incinerators with flue gas temperatures up to 2000° F. without corroding.

Van-Packer PREFABRICATED REFRACTORY **Stack**

Van-Packer Company • Division of the Flintkote Company
P. O. Box No. 306, Bettendorf, Iowa • Phone East Moline, Ill. 3-5288

Hotel Americana is owned and operated by Tisch Hotels, Inc., Morris Lapidus and Leo Kornblath, Designers and Architects; Taylor Construction Company, Miami, General Contractors; Markowitz Bros., Inc., Mechanical Contractors; George O'Mara, Mechanical Engineer. Boiler-burner units installed by Florida Fuel Oil Co., Miami. This luxurious hotel is located in the Bal Harbour section of Miami Beach, Florida.

Petro oil burners are chosen where only the finest can compete

What can a hotel achieve in luxurious living if its designers are allowed to apply the full resources of modern technology and art?

The answer can be found in the new Hotel Americana on the "Gold Coast" of Florida. This "Gateway to the Americas" can well be described as a small city of incredible beauty, graciousness and comfort. Its 475 spacious guest rooms and suites include 30 Lanai apartments, each with its own tropical garden, private entrance and patio. There is a whole series of fine restaurants and supper clubs, lounges and shops, and an Olympic-size pool surrounded by cabanas and recreation areas.

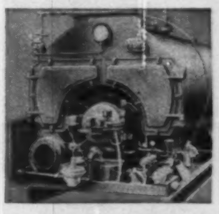
Petro-powered heating plant

The enormous steam and hot water requirements of this lavish community are supplied by three boilers, fired by Petro rotary oil burners—chosen for their proved dependability. Petro burners are famed for their trouble-free firing of low cost heavy oils, and for their low maintenance costs. Models are also available for dual-fuel gas or oil firing.

For full information, please mail coupon.

Among the luxury hotels in the Miami area using Petro burners are:

- Hotel Americana
- Hotel Fontainebleau
- Versailles
- Deauville
- Dupont Plaza



Petro boiler-burner unit—a complete package, ready to go.

Includes Scotch boiler with forced draft firing system for oil, gas or gas-oil. Mounted on steel skids, with fuel, air and control systems installed and tested at factory. Requires little more than service connections.

PETRO

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Makers of quality heating equipment for over 50 years

PETRO, 3232 West 106th Street, Cleveland 11, Ohio
(In Canada, write to 80 Ward Street, Toronto, Ontario)

Please send catalog and specifications on Petro gas and oil firing units.

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Company____

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City____________________________ Zone______ State__________

ACE Plastic Pipe

85 to 100% of your
corrosion-resistant piping needs
now available from 1 source

- CHOICE OF 9 DIFFERENT TYPES
- THE NEWEST OF MATERIALS
- BACKED BY 100 YEARS OF EXPERIENCE

HOW TO SELECT THE RIGHT PIPE

TYPE	SIZES	PROPERTIES	VALVES	ASK FOR BULLETIN
1 ACE-ITE	Threaded Pipe ½ to 6″	General purpose rubber-plastic blend. Tough, impact resistant, economical. Handles most common chemicals to 170°F.	Diaphragm valves with Ace-Ite body, ½ to 2″	80-A
2 RUBBER-LINED STEEL	Flanged Pipe 1½ to 24″ and up	Strength of steel, resistance of hard rubber. Soft-rubber inter-layer aids shock-resistance. Finest for alkalis, most inorganic acids, many organic acids, all salts.	Rubber-lined C.I. Gate, Darling Gate & Check Valves to 24″. Diaphragm Valves to 6″	CE-52
3 ACE TEMPRON	Threaded Pipe 1 to 8″	Best anywhere for hot inorganic chemicals, acids, etc. to 260-275°F. Also wide variety of organics. Excellent rigidity.	— —	96-A
4 ACE RIVICLOR	Threaded Pipe ½ to 4″	Rigid PVC. Excellent aging. Good cold impact strength. Not affected by most inorganic acids and alkalis. Also good for many organics.	Diaphragm valves with Riviclor body ½ to 2″	CE-56
5 ACE PARIAN	Threaded Pipe ½ to 2″	Odorless, tasteless, rigid polyethylene, best for sub-zero uses. Best resistance of any plastic at room temp. except to acetic acid.	Diaphragm valves with Parian body, ½ to 2″	351
6 ACE HARD RUBBER	Threaded ½ to 4″ Flanged 1½ to 8″	The oldest, still tops. Extreme resistance to alkalis, inorganic acids, many organics, all salts. Ideal for chlorine, fluorine. Widest range of fittings.	Rubber-lined or plastic valves above. Also many plug valves, bibb cocks, etc.	CE-51
7 ACE SARAN	Threaded Pipe ½ to 4″ Tubing ⅛ to 1¼″	Odorless, tasteless, general-purpose. Strong, takes high pressures. Not affected by most inorganic acids and alkalis; resistant to most organics.	Diaphragm Valve with Saran body ½ to 2″. Also Saran-lined diaphragm valves to 6″ and up	CE-58
8 ACE-FLEX	Flexible Tubing ⅛ to 1¼″	General-purpose transparent flexible tubing. Non-toxic, odorless, tasteless. Can steam sterilize. Excellent for chemicals.	Ace hard rubber plug valves, bibb cocks, etc.	66
9 SUPPLEX	Flexible Pipe ½ to 2″	Non-toxic flexible polyethylene pipe. Ideal for water distribution lines, drain lines, jet wells, etc. Resistance similar to Parian. Uses insert type fittings.	Diaphragm valves with Parian body, ½ to 2″	CE-57

nSf ACE Saran, Supplex, Ace-Ite and Riviclor are approved by The National Sanitation Foundation for drinking water.

RUBBER AND PLASTIC LINED TANKS, PUMPS, MOLDED PARTS, ETC., FOR ANY NEED

AMERICAN HARD
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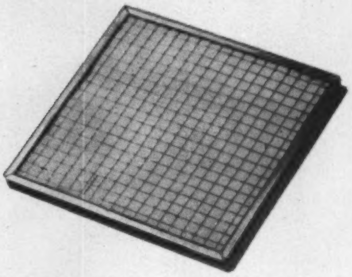
ACE

SEE ACE EQUIPMENT IN CHEMICAL ENGINEERING CATALOG

EQUIPMENT DEVELOPMENTS

Continued from page 204

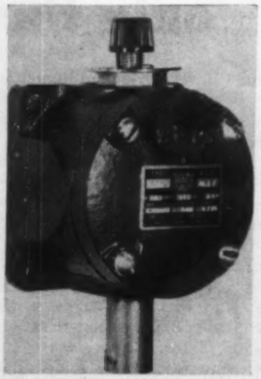
fluids, says company. Port sizes of 1, 1½, 2 in. NPT available; valves fitted for remote control pilot.



Air Filters . . .

. . . for use in air conditioning units, for commercial and industrial air filtering — *Fiber Bond Corp., Dept. HPAC*, 2237 *S. La Salle St., Chicago* 16.

Filtering medium is bonded "Dynell" acrylic fiber made by *Union Carbide Corp.* Medium provides high filtering efficiency, ease of handling, high dust holding capacity, says company. New filters available in all standard sizes, thicknesses ⅛ to 4 in. Are said to be flameproof. Cited feature is 100 percent free face area on intake side. In three types: throwaway (with cardboard frames), permanent and washable, "Revac" vacuum cleanable type.



Pressure Control . . .

. . . designed to provide accurate, reliable pressure control in hazardous locations where explosive vapors, gases are present — *United Electric Controls Co., Dept. HPAC, 79 School St., Watertown, Mass.*

(*Continued on page* 213)

LONG LIFE.. and still going strong!

Darling may be growing older, with silver threads among the gold, but many an ancient couple is still doing a powerful lot of day-to-day living.

And Copelametic units installed nearly 20 years ago are today giving new-compressor performance. That's because they're engineered and built for trouble-free service over a long period of time. There are no belts, seals or manual oiling to run up servicing time.

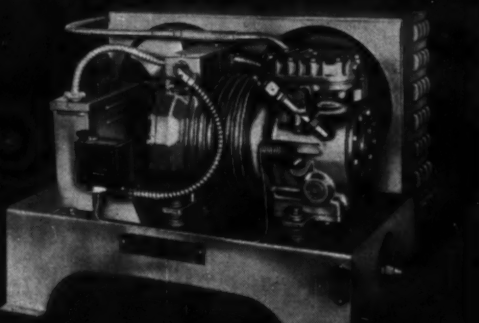
Name the kind of air conditioning and refrigeration installation you're interested in, and we'll provide precisely the Copelametic model to make it give complete customer satisfaction.

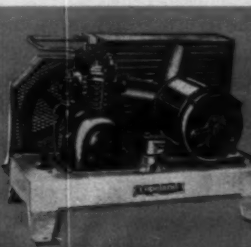
SINCE 1918
Copeland REFRIGERATION CORPORATION, *Sidney, Ohio*

Copelametic

Accessible Hermetics

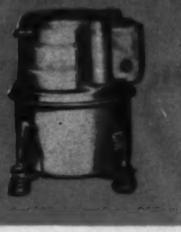
You can get to direct-drive Copelametic motor-compressors effortlessly . . . in a jiffy. No belts or seals, no manual oiling. 90% of service costs eliminated. For use with air-cooled or water-cooled condensers — ⅓ H.P. through 10 H.P.





BELT-DRIVEN
CONDENSING UNITS

WRITE FOR COMPLETE
DATA COVERING
ALL MODELS



COPELAWELD
WELDED HERMETICS

don't just

FILTER your client's air

when you can

CLEAN it

inexpensively!

Westinghouse electronic air cleaning can pay for itself in less than a year!

Commercial building management spends an average of 57¢ per square foot annually in routine cleaning and maintenance — even with mechanically filtered air. Do you know that Westinghouse Precipitron® electronic air cleaning can reduce this expenditure up to 50% — pay for itself in less than a year!

Here are the facts . . .

The heating, ventilating or air conditioning system in the average city building sucks in over 200,000,000 dirt particles — *mostly invisible* — with every cubic foot of air! Mechanical filters rarely catch over 10% of these contaminants — the other 90% lodge in draperies and rugs, soil walls, ceilings and merchandise. Precipitron electronic air cleaning removes up to 97% of *all* atmospheric dirt!

Here are the savings reported by a nationwide variety chain in an actual store test: total dirt reduced 85%; redecorating costs reduced 80%; washing costs down 90%; labor down 25%; soilage mark-downs reduced 37%. Costs attributed to dirt-laden air dropped from $37,000 to $20,000 annually . . . a profit bonus of $17,000!

Such savings prove how many Precipitron installations actually pay for themselves in less than a year . . . then savings become profits. That's why it's just plain good business sense to install Precipitron in commercial buildings.

What is Precipitron? The electronic air cleaner which electrostatically charges dirt particles, attracts them out of the air and automatically washes them down a drain. Sizes permit replacing mechanical filter installations.

Call your Sturtevant Division Sales Engineer or write Westinghouse Electric Corporation, Dept. B-7, Hyde Park, Boston 36, Massachusetts. J-80636

PRECIPITRON — the Westinghouse Electronic Air Cleaner

YOU CAN BE SURE...IF IT'S Westinghouse

If operator inadvertently fires new Remington Captive Stud Tool into inadequate base material—

Captive Stud Guard Assembly prevents free flight of stud which is locked to tool during firing.

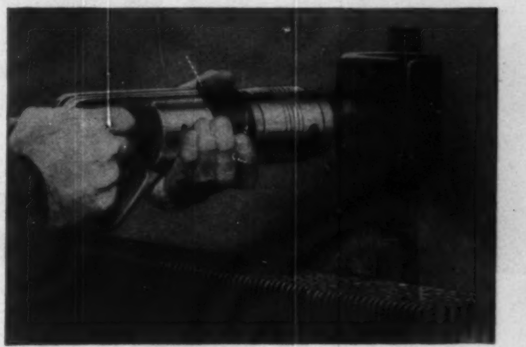
Safest Stud Driver Ever Designed!

Remington Stud Driver...with Model 440 Captive Stud Guard Assembly

Power, efficiency, speed *and safety* are features of the new Remington Stud Driver with Captive Stud Guard Assembly. It's designed to prevent free flight of studs through a working surface... permitting use of the tool in a whole new range of fastening situations.

Just squeeze the trigger to anchor wood or metal sections to concrete or steel with ¼" diameter Remington Studs. Scientifically graded 22 caliber Power Loads furnish *exact* driving force you need to do the work. No pre-drilling, no outside connections required!

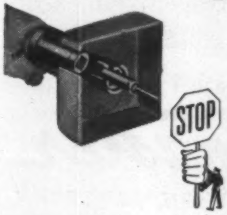
What's more, you can choose from a *complete* selection of ¼" diameter Remington "Power-Guide" Studs. And for particular applications involving repetitive use, you may prefer one of 15 special-purpose guards to adapt the versatile Stud Driver to *your* job requirement!



ANCHOR fin-pipe radiator brackets to concrete walls in *seconds* with this *new* Remington Stud Driver! You can take the tool anywhere, use it anywhere for all your light, medium and heavy-duty fastening jobs.

Exclusive Remington Captive Stud Guard Assembly

has new *"Safety-Zone"*



Heart of the Captive Stud Assembly is combination of square-headed piston and aluminum alloy buffer. Piston is abruptly halted by buffer when base material is inadequate to stop the stud. Remember: If it's the Remington Captive Stud tool, it's the safest Stud Driver on the market!

Remington DU PONT

STUD DRIVER

Remington Arms Company, Inc., Bridgeport 2, Connecticut

Mail coupon for free booklets

How to Select
SAFETY ZONE

Industrial Sales Division,
Dept. HP-3,
Remington Arms Company, Inc.
Bridgeport 2, Connecticut

Please send information about the new Remington Stud Driver and Model 440 Captive Stud Guard Assembly.

Name..

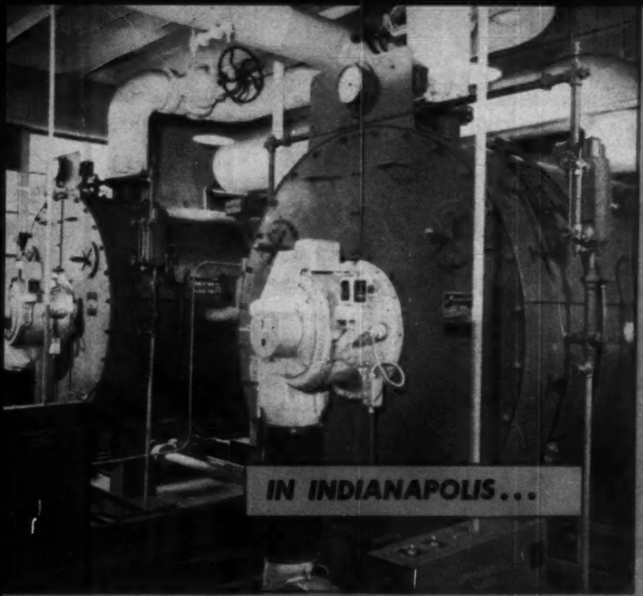
Firm......................*Position*..................

Address..

City......................*State*..................

IN CINCINNATI...

3 *Cadillac* Dealers Get the *Powermaster*® Idea at the Same Time



All 3 sell the same car, the nation's leading "prestige" automobile. All 3 insist on the best all-around product in all their agency operations. All 3 chose *Powermaster* to be certain of the highest efficiency in their new boiler rooms. It's more than coincidence. In Cincinnati, two 70 hp hot water boilers were installed; in Indianapolis, two 100 hp low pressure steam units are needed; in Reading, a 200 hp low pressure steam *Powermaster* filled the bill. But in all cases, the result is the same. New fuel economy and more dependable service are by-products of every installation. For the kind of proof you can readily apply to your own operation, write for Bulletin 1241.

IN READING, PA....

Powermaster®

PACKAGED AUTOMATIC BOILERS
Sizes to 500 hp; pressures to 250 psi

Builders of Dependable Boilers Since 1885

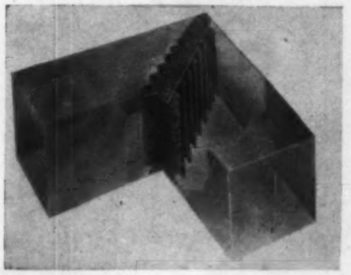
ORR & SEMBOWER, INC.

Morgantown Road, Reading, Pa.

EQUIPMENT DEVELOPMENTS

Continued from page 208

Pressure settings of "H95" unit made with external adjustment knob, calibrated dial. Models available with adjustable range spans between 0, 500 psi, maximum pressures to 600 psi. Switch differentials in 22 models range 1.5 plus ½ in. Hg to 7 plus 3 psi. Switch classes suitable for 180 F ambient temperatures, rated at 15 amp at 115 or 230 volts a-c.



Vane Rail . . .

. . . designed for quick, easy installation of vanes — *Cain Mfg. Co., Div. of Cain Roofing & Sheet Metal Works, Dept. HPAC,* 1111 *Fifth Ave., N., Birmingham, Ala.*

"Instant-Vane-Rail" is 24 gage galvanized in 100 ft lengths. To use: pull out to desired length, shear off, insert vanes, peen with hammer.

Submersible Pumps . . .

. . . with 6 in. diameter — *F. E. Myers & Bros. Co., Dept. HPAC,* 249 *Orange St., Ashland, Ohio.*

Units designed for deep well installations where large volumes of water are needed. Pumps may be installed in wells as deep as 700 ft; product line's top capacity at 50 ft

Everlasting **Valves**

are superior for many services

BOILER BLOW-OFF
Quick acting, also handwheel operated "Y" and angle types. For pressures up to 600 psi.

GENERAL SERVICE
Where drop-tight seal and full flow is essential.

CYLINDER OPERATED
Can be remotely controlled, electrically or manually.

STEAM JACKETED
Assures free flow of viscous materials.

WEIGHT-OPERATED
For automatic drains or emergency shut off.

When you want

- quick action
- drop-tight seal
- minimum pressure drop
- straight-through full flow
- self-grinding rotating disc
- valves that cannot wedge or jam

then you want an Everlasting Valve

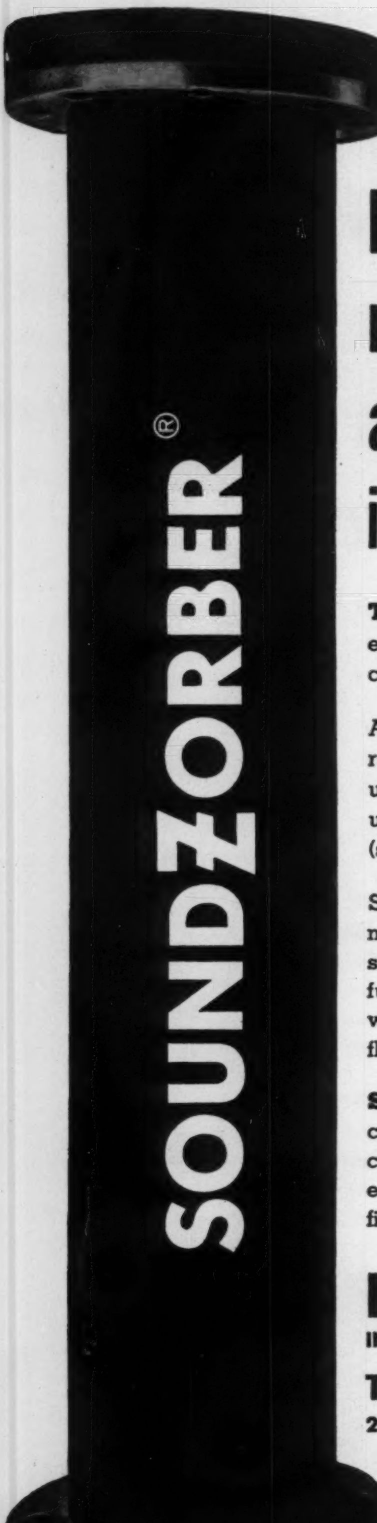
No other valve has all the Everlasting features . . . proven by half a century of service to assure dependable, leak-tight service.

**LET US HELP YOU
WITH YOUR VALVE PROBLEMS**

EVERLASTING *Valves*

EVERLASTING VALVE CO.
61 FISK STREET, JERSEY CITY 5, N. J.

EV302



How to stop noise, vibration and "hammer" in water lines

The original SoundZorber expressly designed for use in air conditioning water lines . . .

A wire-reinforced wrapped fabric rubber pipe, SOUNDZORBER can be used continuously in water lines at up to 250 psi working pressure (safety factor: 5 to 1).

Smaller sizes ½" to 3" available with male I.P.T. bronze fittings. Larger sizes available with integral full-faced rubber flanges backed up with Series 15 or Series 30 steel flanges. No metal-to-metal contact.

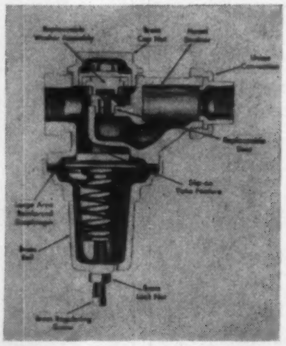
SOUNDZORBER is but one of a complete line of Finn vibration controls. Finn has control devices for every vibration problem in your field. Write for complete information.

FINN
INDUSTRIAL DIVISION
FINNFLEX

T. R. FINN & Company, Inc.
200 Central Ave., Hawthorne, N. J.

® Reg. U. S. Patent Off.

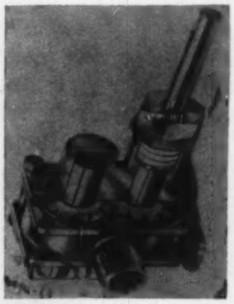
depth more than 13,000 gph, company says. Units are multistage centrifugal turbine pumps; made in flat pancake stages for lower capacities at high head, turbine bowl type construction for higher capacities at lower heads.



Water Pressure Regulator

. . . designed for apartment house installation — *Wilkins Regulator Co., Dept. HPAC,* 2031 *E. 27th St., Los Angeles.*

New 1¼ in. unit with union end features all brass construction, slip-on yoke for quick seat and disc replacement, nylon threaded diaphragm, pignose seat washer for durability, company says. Products range ¾ to 1¼ in. Controlled precision testing obtains quality production, according to manufacturer.



Gear Pump . . .

. . . with stainless and Hastelloy bodies suitable for nonlubricating, corrosive fluids — *Eco Engineering Co., Dept. HPAC,* 12 *New York Ave., Newark, N. J.*

Unit — with ¾ in. inlet and outlet ports — features housings of 316 stainless steel or Hastelloy C with

POWELL

world's largest family of valves

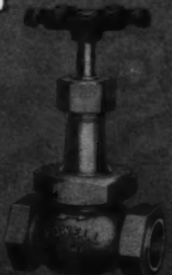


Fig. 1861—Small Stainless Steel Globe Valve for 200 pounds W.P. Flanged end valves, 150 W.P., and screwed and flanged Angle Valves can be furnished.

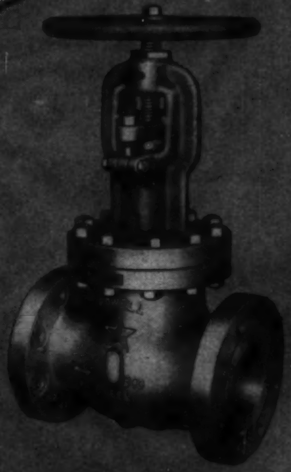


Fig. 3031—Steel Globe Valve for 300 pounds W.P. Outside screw rising stem and yoke. Plug type discs for either steam or oil service can be supplied. Screwed-in seat rings.

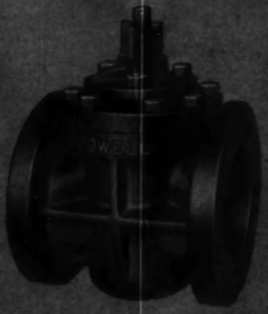


Fig. 3059—300-pound Steel Lubricated Plug Valve. 6" Bolted Gland Type, without stop collar. Valves with stop collar and worm-gear operated valves also available.

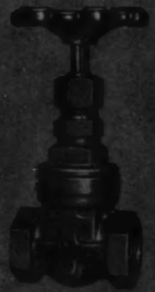


Fig. 512—Small Bronze Gate Valve for 150 pounds W.P. Screwed bonnet, inside screw non-rising stem, solid wedge disc. Flanged end valves also available.

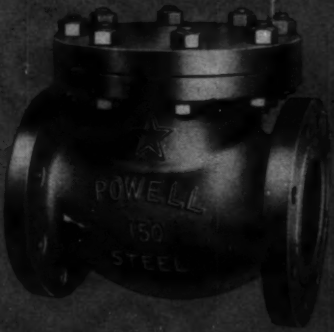


Fig. 1561A—Steel Swing Check Valve for 150 pounds W.P. Full, unrestricted flow through the valve when the disc is in open position. Welding end valves also available.

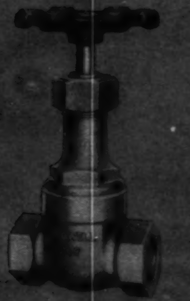
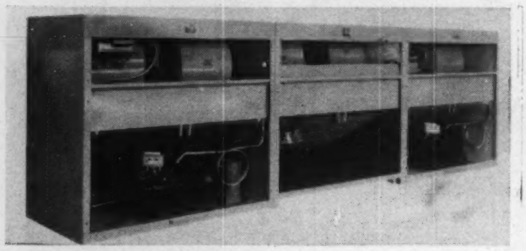


Fig. 1832—Small Stainless Steel Gate Valve for 200 pounds W.P. Screw-in bonnet, inside screw rising stem. Also available with flanged ends, 150 pounds W.P.

For every flow control problem Powell offers more kinds or types, available in the largest variety of metals and alloys to handle every flow control requirement. Powell distributors are located in all principal cities and maintain inventories to fill almost any need. For special engineering problems, write direct to:

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

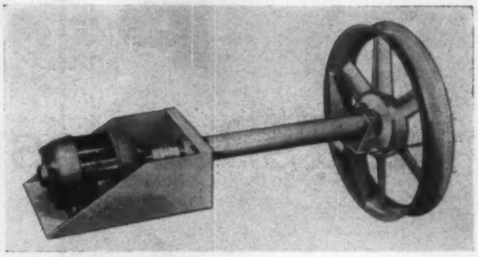
teflon gears, internal teflon bearings and packing. Pump designed to operate at 1750 rpm with fluids of low viscosity, at capacities to 10 gpm, pressures to 100 psi. Fluids with viscosities to 5000 ssu may be pumped at reduced speeds.



Air Cooled Conditioners . . .

. . . in 15, 20 ton self-contained units for roof mounting — *Typhoon Air Conditioning Co., Div. of Hupp Corp., Dept. HPAC,* 505 *Carroll St., Brooklyn* 15.

Fifteen ton "Model ACSC-166" consists of two 8 ton air cooled condensing units on either side of 15 ton air handling unit; weight of unit 1700 lb. Larger, 20 ton "Model ACSC-216 consists of two 10 ton air cooled condensing units; weighs 1925 lb. Both units measure 88 in. wide, 33 in. deep (67½ in. with gas fired duct heaters), and 56 in. high.



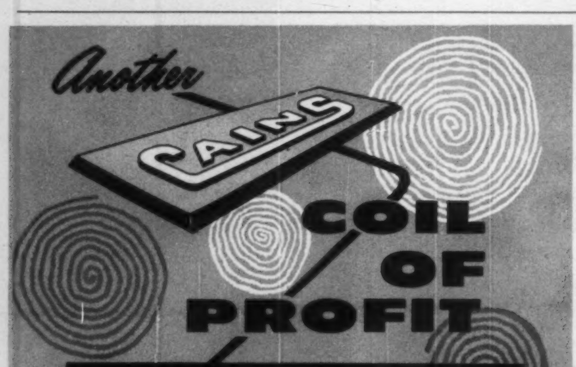
Orifice Ring Fan . . .

. . . designed for operations where motor must be kept out of air stream — *Chicago Blower Corp., Dept. HPAC,* 9863 *Pacific Ave., Franklin Park, Ill.*

Direct drive fan basically designed for exhausting gases, corrosive fumes but may also be used to circulate high temperature air for drying, company says. Fan wheels said to produce high pressure characteristics yet maintain low noise level; blade angles — large at hub — decrease to small values at tips. Steel, aluminum wheels available with 2, 4, 6, 8 blades. Fan sizes range 24 to 42 in. Ball bearing motors used in 14 "ES" models; will operate in horizontal, vertical positions.

Indoor-Outdoor Temperature Control

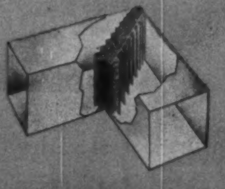
. . . with outdoor weather sensing unit that measures combined effects of sun, wind, temperature, and regulates indoor heat accordingly — *Minneapolis-Honey-*



INSTANT-VANE RAIL

ELIMINATES

Layout—Tab Cutting—Hole Punching—Spot Welding—Riveting—Etc. Results in a Savings Up to 70% over old methods.



Best method ever devised for installing Turning Vanes (single or double) in sq. elbows. In coils. Pull out, shear off—insert vanes and peen with hammer. No valuable time lost.

Union Made

SOLD ONLY THROUGH JOBBERS AND DISTRIBUTORS
Some Territories Open for Manufacturers Agents Calling on Jobbers and Distributors
CAIN MANUFACTURING CO.
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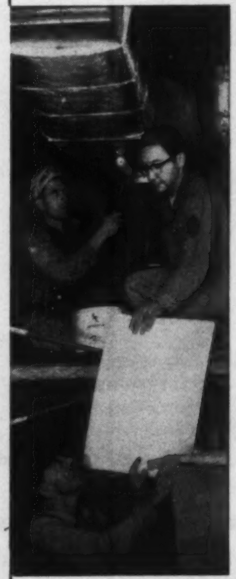
Bond Insulation PERMANENTLY with

ST. CLAIR

Specially Formulated Insulation Adhesives



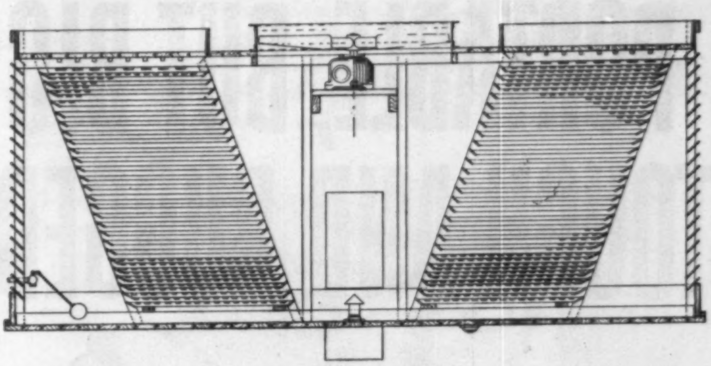
ST. CLAIR Insulation Adhesives provide excellent coverage, high heat resistance and easier handling of insulation which can be bonded immediately or up to 45 minutes after applying adhesive.

These insulation adhesives afford fine results for bonding insulation to ducts. They supersede pins and clips, wires, screws, and caps, because they save on installation cost while providing a better, neater and more permanent bond.

ST. CLAIR also produces clear and white adhesives for bonding lap seams on pipe insulation—also other adhesives for applying foil and vinyl facings to glass fibre.

Send for Free Sample & Catalog

ST. CLAIR RUBBER CO.
440-D JEFFERSON AVE. • DETROIT 26, MICHIGAN

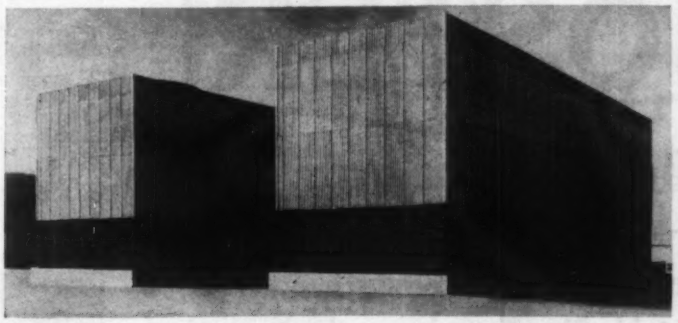


Phillips

"DUAL AIRSTREAM"

The Phillips Dual-Airstream — Series "DA" Cross-Flow Towers have the answer when low tower height and minimum plan area size are desired.

The DA Series Towers are designed for single cell capacities of 150 to 600 tons of refrigeration and are also available in multi-cell arrangements. The DA Series Towers constructed of California Redwood or Hot Dipped Galvanized Structural Steel Framing and Corrugated Cement Asbestos Board Siding offer long life with a minimum of maintenance.

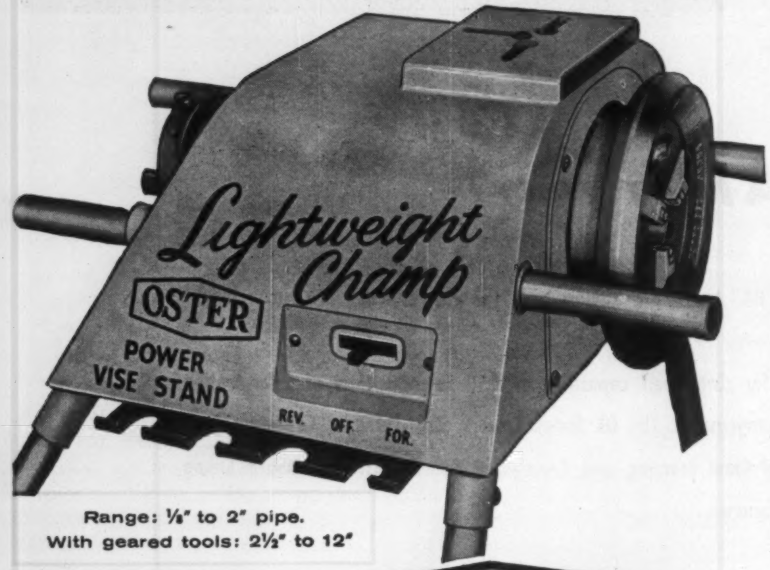


Shown above is a conventional Phillips Cooling Tower Co. counter-flow type installation. The Phillips counter-flow towers are individually designed to economically meet each project's particular requirements.

Counter-flow type towers may be designed to have any desired capacity, and are offered in the same materials as the DA Series Towers for long life and minimum maintenance.

Phillips Cooling Tower Co., Inc.
220 DUPONT ST., BROOKLYN 22, N.Y.

PORTABLE, BUT BIG
TOUGH AND RUGGED!



Range: 1/8" to 2" pipe.
With geared tools: 2½" to 12"

OSTER

NO. 432 Lightweight CHAMP

...the Heavy-duty Power Machine built to outlast any Portable Pipe Threader on the market!

OSTER
Builders of the World's Most Complete Line of Threading Equipment

For other Models write for General Catalog

Rugged, all-steel construction makes the Oster No. 432 practically indestructible. Powerful heavy-duty motor is fully protected from dirt and weather.

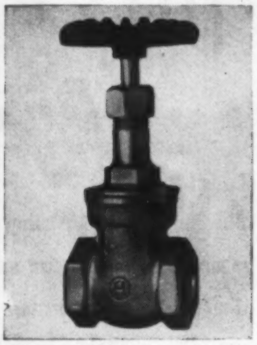
NEW "POWER-MATIC" FRONT CHUCK automatically grips pipe tight for both left- and right-hand operation. Replaceable jaw inserts eliminate need for jaw sharpening, can be replaced quickly and easily at low cost. Universal-centering rear chuck aligns pipe perfectly for sharp, clean, threads.

See Your Oster Distributor or Write Today!

THE OSTER MANUFACTURING CO. • 1347 East 289th St., Wickliffe, Ohio

well Regulator Co., Dept. HPAC, 2753 Fourth Ave. S., Minneapolis.

Company offers choice of "Indoor Round Thermostat" or "Indoor Electric Clock Thermostat", with outdoor thermostat "T846A" in unit. Outdoor thermostat starts resetting indoor thermostat control point when outside temperature drops below 55.



Bronze Valves . . .

. . . added to manufacturer's valve line — *Hammond Brass Works, Dept. HPAC, 1844 Summer Blvd., Hammond, Ind.*

New units are as follows: "No. 626" rising stem double disc gate valve, ¼ in. to 2 in.; "No. 415" needle point globe, ⅛ to ½ in.; "No. 909" swing check, composition disc, ¼ to 2 in.; "No. 912" swing check, with solder joints for copper tubing, ½ to 2 in. Shown above is model "No. 626."

Pipe Insulation . . .

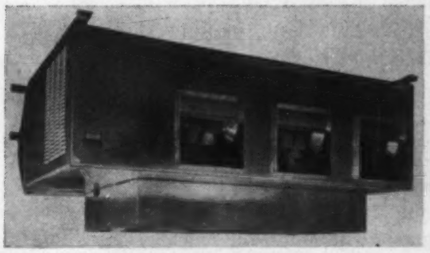
. . . with built-in tie wires — *Baldwin-Hill Co., Dept. HPAC, 500 Breunig Ave., Trenton, N. J.*

Insulation can be applied to large

EQUIPMENT DEVELOPMENTS

Continued

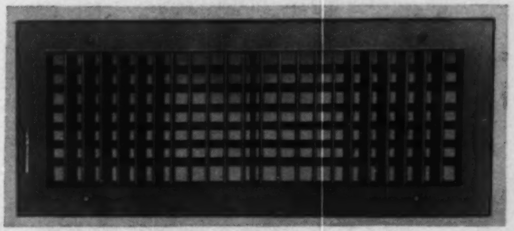
diameter lines rapidly, company says. Product felted from high temperature, moisture resistant spun mineral wool; designed to withstand temperatures to 1200 F. Exterior surface faced with metal fabric of wires welded in 2 × 2⅝ in. rectangular mesh held in place by wires tied through spun wool to inner facing of 1 in. expanded metal lath. Speed fastening on pipe is accomplished by hooking seven wires which extend from one end of outer mesh fabric under opposite stay wire and bending them over and back, according to manufacturer. Available in 2 ft sections and 1½ to 4 in. thicknesses for pipe sizes 4 to 30 in.



Air Handling Units . . .

. . . for use in high velocity systems — *Recold Corp., Dept. HPAC, 7250 E. Slauson Ave., Los Angeles 22.*

Vertical, horizontal "Multi-zone" units range in size from 2350 to 29,000 cfm. Forward curved wheels designed to handle applications up to 3½ in. of static pressure, and backward curved wheels for applications up to 6 in. available as accessories.



Register Louvers . . .

. . . in new style of placement for heating, air conditioning registers — *Waterloo Register Co., Dept. HPAC, Waterloo, Iowa.*

In new style grilles and registers, louvers placed with broad edge pivoted at front of grille. With any angle of setting of adjustable extruded aluminum louvers, appearance of grille or register is not changed.

Industrial Water Coolers . .

. . . for closed system applications with critical process water temperatures — *Baltimore Aircoil Co., Inc., Dept. HPAC, P.O. Box 7322, Baltimore 27.*

In the new, automatic world you're making . . .

Your ideas work better when you work with HONEYWELL

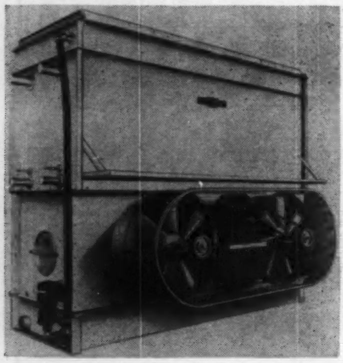
More products to give your ideas greater scope. From Honeywell you get a great variety of products both mechanical and electrical. Honeywell is the only company that makes a complete line of pneumatic, electric and electronic controls plus instrumentation for commercial buildings. With Honeywell your choice is wider, your ingenuity less restricted.

More ideas that go with yours. Honeywell has pioneered the concept of central-systems control for commercial buildings, now the accepted trend. This and other Honeywell ideas have increased recognition of the importance of operational equipment, and helped to make your contribution bigger, better and more important.

More support. Honeywell works with you on every job, frees you from annoying details, saves you time, even helps you sell. And the assistance of Honeywell specialists in each of 112 offices throughout the country is as near as your phone.

Look over the Honeywell products and ideas on the following pages. And, remember, each is backed by the kind of support that only Honeywell can offer you.

FOR MORE TO WORK WITH ... **WORK WITH HONEYWELL**

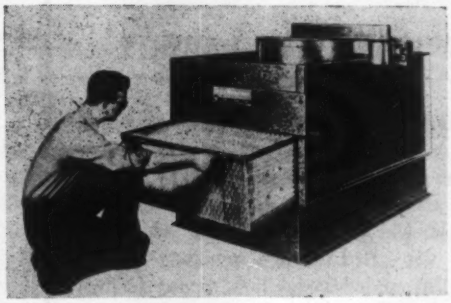


With these units, is possible to save up to 95 percent of water normally used for industrial cooling, says company. Three styles include centrifugal fan draw-through units, centrifugal fan blow-through units, propeller fan blow-through units. May be used to cool water for diesel or gas engines, air compressors, plastic molds, other water jacketed equipment.

Cooling Tower . . .

. . . with 15 to 200 gpm capacity — *Binks Mfg. Co., Dept. HPAC, 3122 W. Carroll Ave., Chicago 12.*

Unit measures 44 to 84 in. in height, depending on capacity. Compactness of new tower made possible through use of multifinned internal decking constructed of noncorrosive plastic specially compounded for use in cooling towers, company says. Water enters at tower top under low head of pressure; gravitational flow carries it down over multiple plastic decks mounted in two receptacles at each end of tower. Internal decking units easily removable; no painting surface protection needed, according to manufacturer.



Check Valve . . .

. . . for gas and air reciprocating compressors, not equipped with automatic unloaders — *Williams Gauge Co., Inc., Dept. HPAC, 2 Gateway Center, Pittsburgh.*

"Williams-Hager Silent Gas-Air Check Valve" controls surge and hammer when compressor is in opera-

FOR MORE TO WORK WITH ... WORK WITH HONEYWELL

For your mechanical systems... Honeywell Hi Velocity Double-Duct Mixing Box Controls

Now your choice of two constant volume systems

1. Honeywell's new Volumatic* system gives clients dependable, economical, constant volume control of double-duct systems. This control system uses a new type of piston motor with nylon bearings which requires less lubrication. This new Volumatic control system can be applied to all sizes and types of mixing boxes. The sensitive pressure regulator uses a fixed restrictor, error-proof, easier to install and maintain.

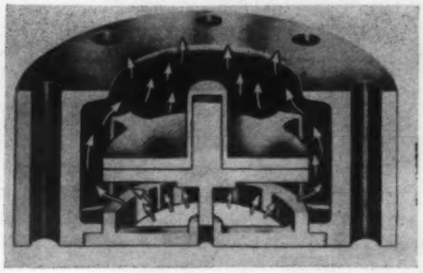
2. Honeywell's Duablend* system gives your clients peak performance and minimum maintenance. The Duablend system features *two* pressure regulators to assure constant volume from *each* duct (under control of space thermostat) regardless of pressure changes. Its exclusive Sub-master pressure regulator provides a similar stabilizing control action to the Sub-master duct thermostat in heating and ventilating units.

The Duablend system uses the simple Honeywell Air-Balance Valves*. These valves have no mechanical parts to wear and no adjustments. The valves operate on the balance of air pressure on two sides of a flexible diaphragm.

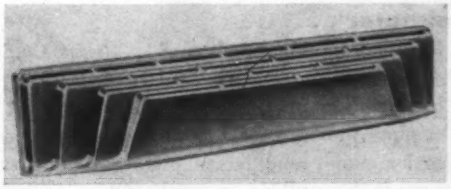
*Trademark

Honeywell

H First in Controls



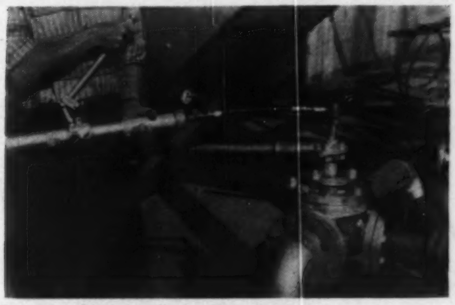
tion. Unit operates silently, except when discharge valves of compressor are leaking badly, in which case it acts as alarm.



Perimeter Diffuser . . .

. . . with adjustment for heating and cooling — *Titus Mfg. Corp., Dept. HPAC, Waterloo, Iowa.*

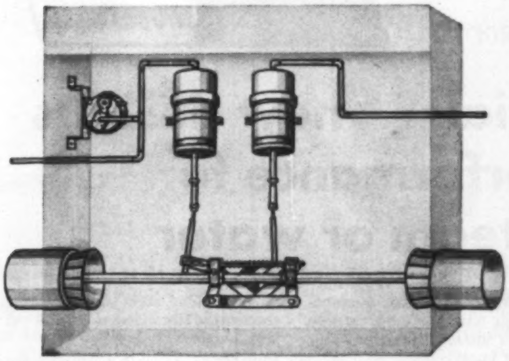
Built-in damper on "Model P-125" adjusts from full open to full closed within diffuser. Volume control located on side of diffuser. Adjustable base provided; balancing stops also furnished. "Model P-75" has same basic design and new features, except for "dual adjustment," says manufacturer. Both models 24 in. long.

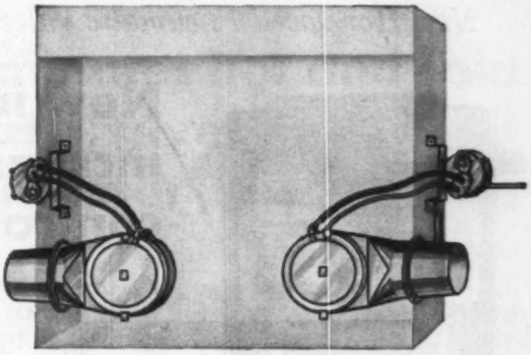


Valve Lubrication System . . .

. . . with high pressure hydraulic handgun for servicing plug valves — *Meter and Valve Div., Rockwell Mfg. Co., Dept. HPAC, 400 N. Lexington Ave., Pittsburgh 8.*

New "400-C" is self-priming, can be used in any position, says company. Hose and coupling can be locked to buttonhead fitting in valve shank; bypass valve turns to relieve pressure, permitting separation.



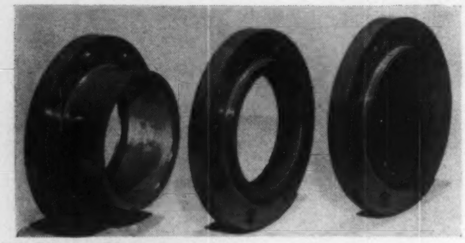


Here's how these two dependable systems work

Volumatic System: 1) Space thermostat operates motor to change ratio of hot and cold air. 2) Pressure regulator in mixed air operates another motor to adjust linkage, increase or decrease total volume from hot and cold ducts. Or, 1) Space thermostat operates motor to control hot duct valve. 2) Pressure regulator in mixed air operates motor to control cold duct valve, maintain constant total volume. This low cost system provides dependable control, is easy to maintain and fits all sizes and types of mixing boxes.

Duablend System: 1) Space thermostat resets Sub-master pressure regulator controlling valve in hot duct. 2) Pressure regulator in mixed air controls the total air volume by operating cold duct valve. 3) Change in flow resulting from changes in hot duct pressure is corrected by Sub-master regulator operating hot valve without disturbing cold. 4) A change in flow caused by changes in cold duct pressure is corrected by regulator increasing total flow operating cold duct valve. Sub-master flow regulator holds hot duct flow constant.

Other cited features: relief fitting on hydraulic system to guard against injury when gun is pumped when empty; 15,000 psi gage, indicating sufficient lubricant pressure point.



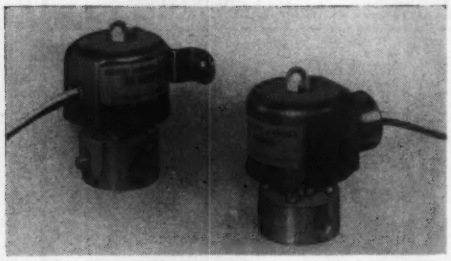
PVC Pipe Flanges . . .

. . .in 6, 8 in. sizes — *Luzerne Rubber Co., Dept. HPAC, Muirhead Ave., Trenton 7, N. J.*

Threaded, socket, blind, reducing flanges available in 6, 8 in. sizes. Type "1" used for normal impact; type "2" for high impact. Company's product line includes pipe, fittings ¼ to 12 in.

Solenoid Valve . . .

. . .available in brass, stainless steel — *Controls Company of America, Dept. HPAC, 2450 N. 32nd St., Milwaukee 45.*



New two-way valve, model "291," can be used for air, gas, water, oil, common industrial fluids, company says. Unit designed for specific use in tight equipment corners, crevices; wherever compact normally closed valve is needed to control flow. Applications for new unit include water softeners, humidifiers, automatic machinery, welders, similar equipment.

Preheater . . .

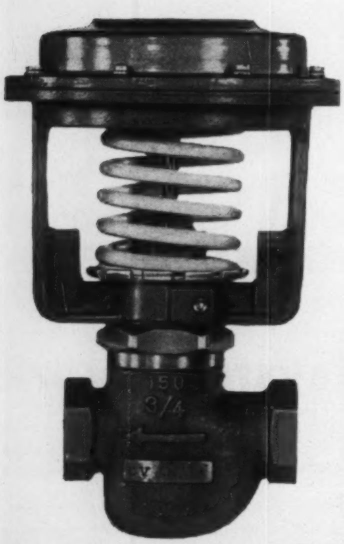
. . .for heavy liquids in bulk tank — *Rempe Co., Dept. HPAC, 340 N. Sacramento Blvd., Chicago 12.*

"Hot Spot" lowered in tank through manhole; inlet, outlet pipes provided for heating by steam, hot water. Holes for supply and return pipes and fluid suction pipe made by drilling or torch cutting in manhole cover. Flow accumulator causes heavy oils, other liquids to flow over heated pipes before entering suction line, company says. Coil is 1½ in. steel pipe ex-

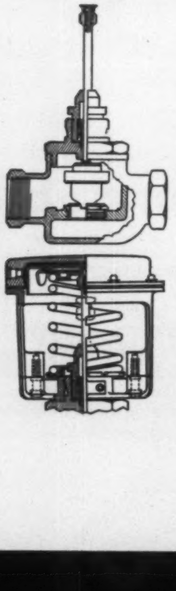
For your mechanical systems . . .
New Honeywell Pneumatic Valve and Motor

FOR MORE TO WORK WITH . . . WORK WITH HONEYWELL

New materials . . . new designs increase performance for control of steam or water



Single seated or three-way valves available in a complete range of sizes. For more information, call your local Honeywell office.



Valve features! Equal percentage throttling plug plus longer stroke gives better control of steam or water flow at light load.

Exclusive Teflon cone packing lowers friction, lasts longer, requires less lubrication. Easier to change because it comes out with packing nut.

Spring loaded stem and disc holder connection eliminates noise and wear, lasts longer.

Plug type throttling guide eliminates "pocking" of discs due to impingement of fluid through old V Port types.

Packing nut design eliminates periodic tightening, impossible to over- or under-tighten.

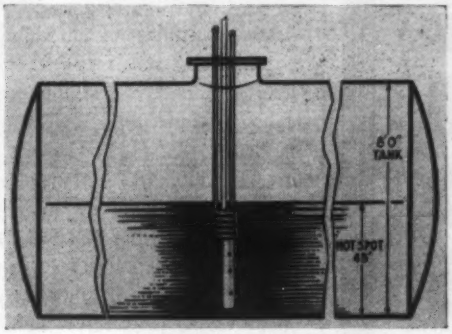
Actuator features! Diaphragm design gives more power for smaller diameter. Saves space, positions valve better, gives high close-off ratings. Larger diameter spring eliminates buckling, doesn't rub stem.

Tough Neoprene diaphragm gives longer wear, in normal temperature use. (Silicon available for extremely high temperatures.)

Quick stem-release slide makes actuator easy to remove from valve to change size or to service.

Normally open and normally closed actuators easily interchangeable. Sizes interchangeable, too.

All parts—corrosion resistant.

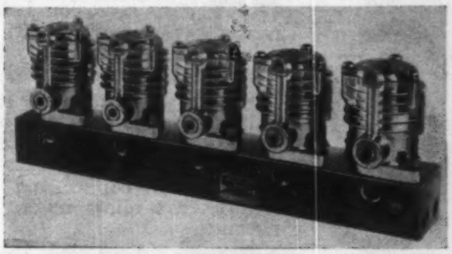


tending depth of shell. Shell is 12 gage sheet steel; vent holds 1½ in. diameter. Available in 16 in. diameter shell for manholes 16½ in. opening and larger; 14 in. diameter shell for manhole openings 14½ to 16 in.

Air Diffuser . . .

. . . in combination unit with fluorescent illumination — *Barber-Colman Co., Dept. HPAC,* 1300 *Rock St., Rockford, Ill; Day-Brite Lighting, Inc., Dept. HPAC,* 16 *N. Ninth St., St. Louis.*

Developed jointly by two companies, "Paraflo" troffer diffuses conditioned air length of center parabolic louver of perforated metal. Center V gives lateral deflection to air for spread type diffusion. Units deliver up to 150 cfm at normal room temperatures. Available in 1 × 4 and 1 × 8 ft models for "Rapid Start" and "Slimline" lamps; depth is 5⅞ in.



Multiple Station Manifolds . . .

. . . designed to mount solenoid pilot valves — *Valvair Corp., Dept. HPAC,* 454 *Morgan Ave., Akron* 11.

New units said to eliminate need for separate sub-

For your mechanical systems...Honeywell's Unit Ventilator Team

M0516 Damper Motor. Rolling diaphragm reduces friction, gives more precise position, prevents sticking.

V0512A Valve. Low friction Teflon cone packing aids rolling diaphragm's smooth action, gives improved modulation.

L0907 Air Stream Thermostat works with room thermostat to reset air temperature delivered by ventilator.

T0901A Pneumatic Round, most accurate schoolroom thermostat available. Low mass bimetal for fast response.

Eliminates hot and cold blasts, gives better unit ventilator performance

This Honeywell control team of air stream thermostat, valve, damper motor and room thermostat exclusively developed for unit ventilators, levels the peaks and valleys of heat and cold so troublesome in high occupancy areas such as schoolrooms.

Air temperature delivered by the ventilator changes only as a result of change in room temperature. Cycles of hot and cold are sensed by the air stream thermostat and corrected before they start. All members of the "team" work together smoothly and efficiently. For full information, call your local Honeywell office, or write Minneapolis-Honeywell, Dept. AC-3-49, Minneapolis 8, Minnesota.

Honeywell

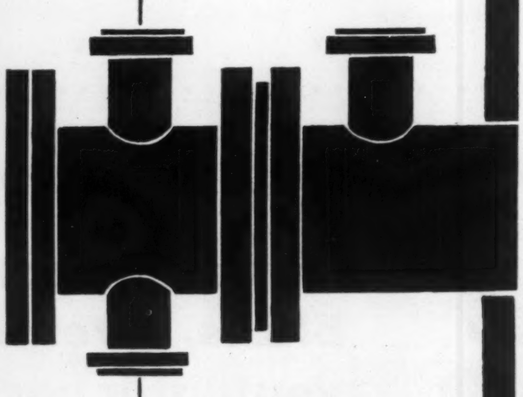
First in Controls

Announcing
CORROSION
CONTROLLED
VESSELS

NOW stop corrosion before it starts in new storage vessels. Specify a Novelon lined vessel from Ellicott to prevent corrosion, rusty water; contaminated contents.

Ellicott has combined its fifty years of building unfired pressure vessels and storage tanks—with ten years of developing a complete line of Novelon Linings of cement, rubber, lead, copper and the new plastic linings that allow much higher heat resistance.

Novelon linings solve the corrosion problems in storing and processing water, acid, food and chemicals. Send us your corrosion problems today.



Specify ELLICOTT
THERE'S NO EQUAL

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FABRICATORS, INC.
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Representatives in Major Cities
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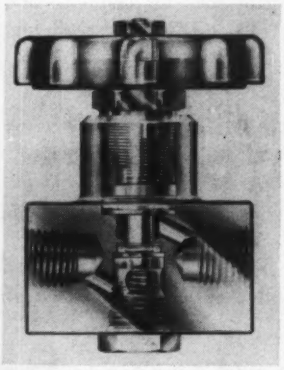
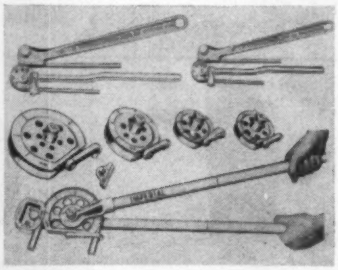
bases. Manifolds, of aluminum alloy bar stock, offered in two, three, four, five station types. Common inlet, exhaust, individual cylinder ports tapped 1/4 in. NPT. Conduit outlets are 1/2 in. NPT. Manifolds have three tapped holes on underside to facilitate mounting and are designed to accommodate either three-way normally open or three-way normally closed pilot valves in unmixed groups.



Manual Shutoff Valve . . .

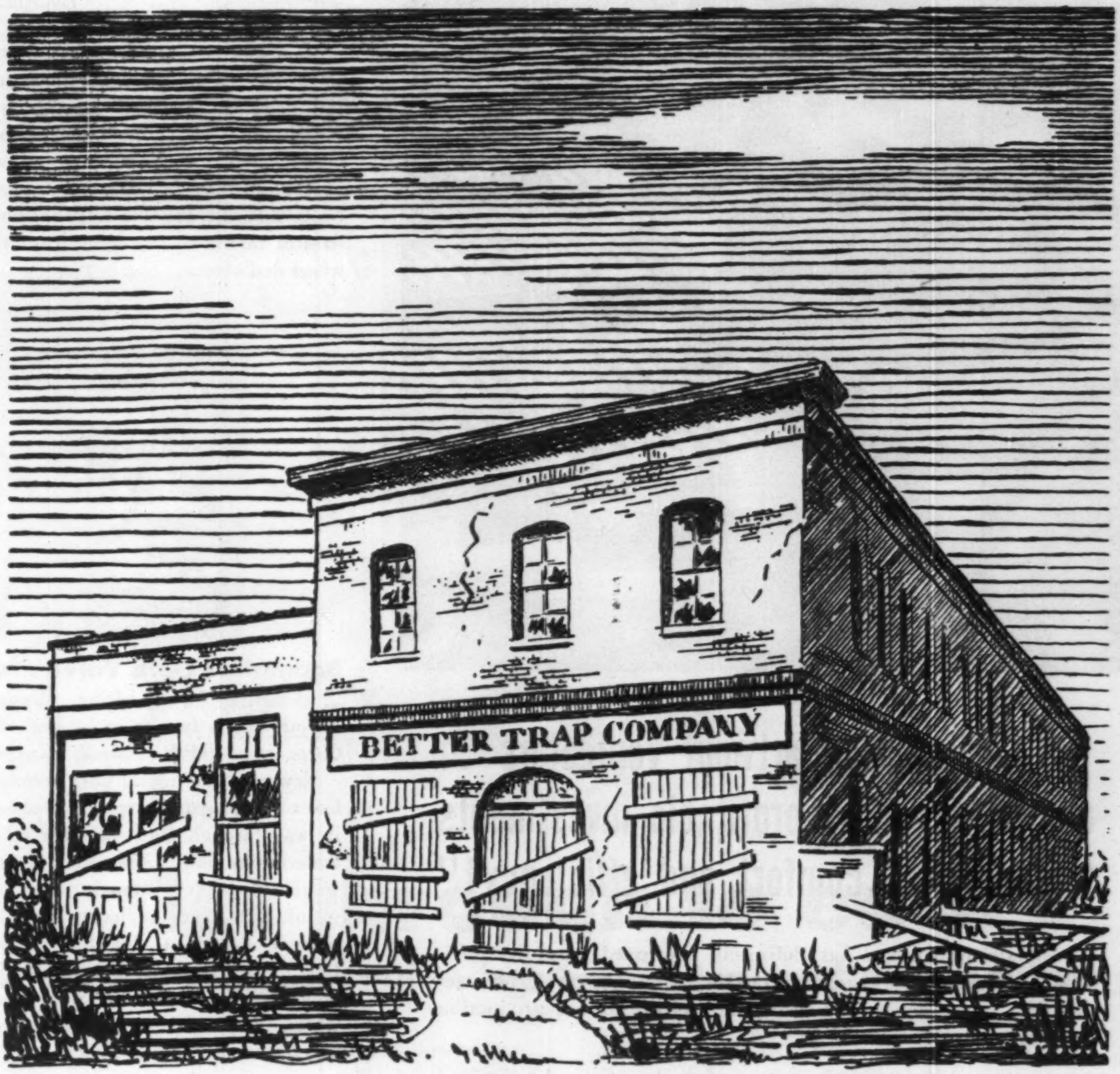
. . . for high pressure gas systems — *Circle Seal Products Co., Dept. HPAC, 2181 E. Foothill Blvd., Pasadena, Calif.*

"Model 949T" shuts off by means of resilient o-ring; o-ring withdrawn completely, automatically from fluid stream as soon as valve opens. Throttling accomplished by conical metal plug which varies orifice area. Rated at zero to 5000 psi, model can be used in hydraulic or pneumatic service.



Combination Benders . . .

. . . for hard and soft tubing — *Imperial Brass Mfg. Co., Dept. HPAC, 6300 W. Howard St., Chicago 31.*



MOUSETRAP, STEAM TRAP, SEWER TRAP

... it makes no difference

. . . the world *won't* beat a path to the door of the man who builds a better one *and then doesn't advertise it* so that people will know about his product, know where it can be bought and how much it costs.

Advertising benefits the buyer, too. It tells you the product story, makes it easy for you to buy. Even more important to you, advertising leads to mass production and volume sales . . . which means lower costs and lower prices.

Yes, "Advertising Benefits You" . . . 'specially business-paper advertising.

YES ADVERTISING BENEFITS YOU!

"They're Swartwout Ventilators... one of our most profitable investments for employee comfort and efficiency!"

"Adequate ventilation has definitely improved employee efficiency and morale. It's turned out to be just as important as correct lighting, safety devices and cleanliness. As a result our production costs are lower."

Management is fast becoming aware of the benefits to be obtained from engineered ventilation. Many old plants need new more efficient systems. New plants *must* have them.

Whatever type or size of ventilation job you're interested in, you can be sure there's one or more Swartwout Roof Ventilators that will economically supply fresh air — rain or shine, windy or calm. They're noted for maximum capacity per roof opening size, weatherproofness and economical installation.

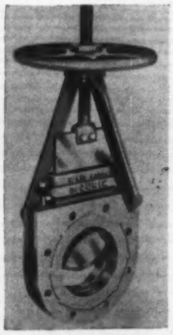
Our ventilation engineers will work with you on unusual problems. As a guide to more profitable ventilator installations, send for Catalog 353 today.

The Swartwout Co.
Ventilation Engineering
18568 Euclid Avenue Cleveland 12, Ohio

EQUIPMENT DEVELOPMENTS

Continued

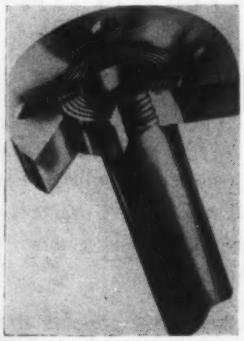
Sizes of tubing bent range 1/4 to 7/8 in. OD. New units make bends to 180 deg, can be used for copper, aluminum, steel, stainless steel tubing. Benders for four or more sizes of tubing furnished in metal kits. Units adapted for bending various sizes of tubing by changing forming wheel and shoe.



Bonnetless Gate Valve . . .

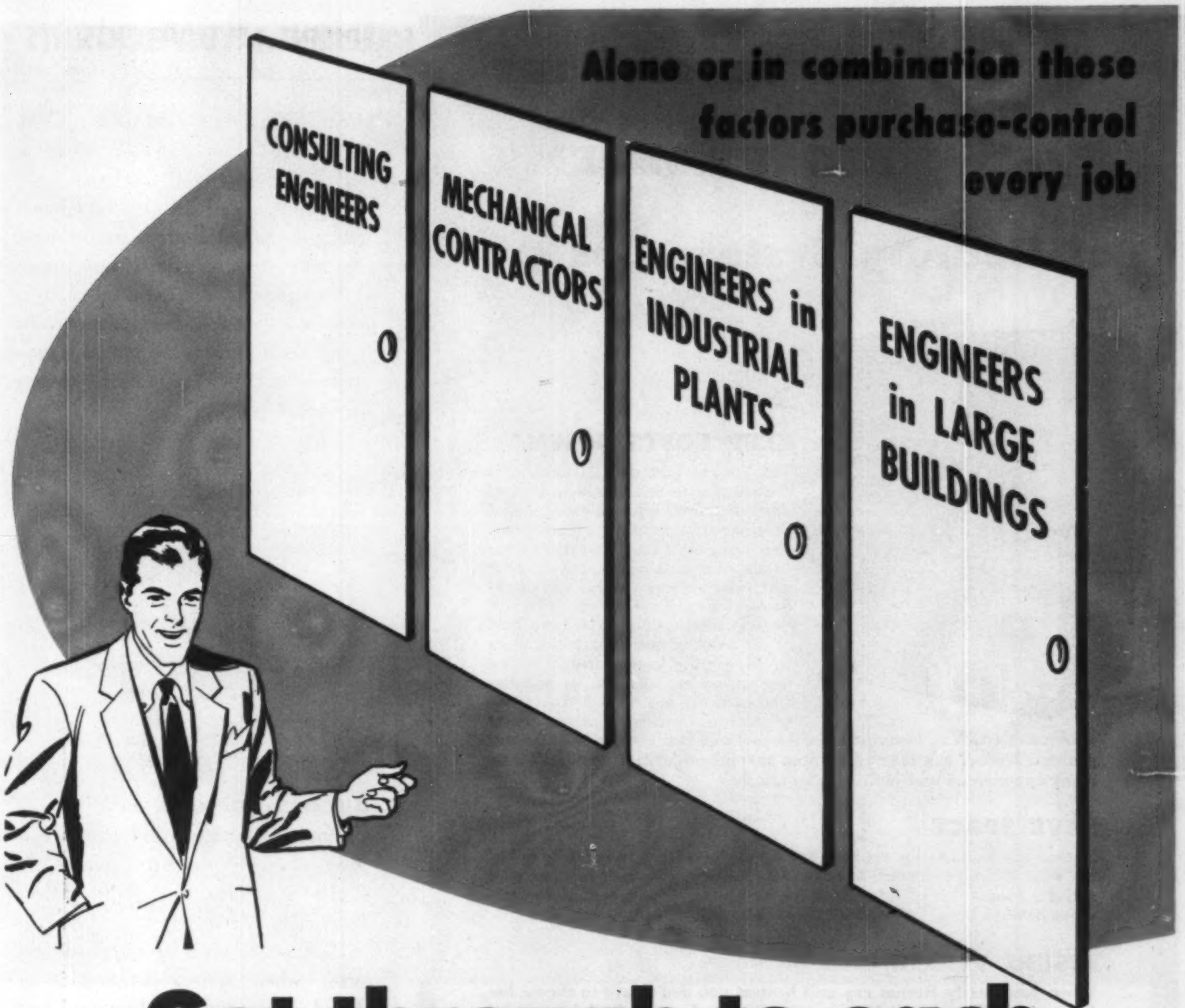
. . . designed for handling fibrous, viscous, slurry type flows — *DeZurik Corp., Dept. HPAC, Sartell, Minn.*

New unit has round port bottom; lower end of gate sharpened to shear its way through fibers or other solid material in flow. Upper end is full width, extends through packing gland. Gate made of heavy plate to prevent distortion, buckling under line pressure, company says. Available in sizes 3 to 24 in. with hand wheel, lever, cylinder, similar operators.



Flanged Fitting . . .

. . . designed for flexibility in light-wall stainless piping systems — *Speedline Stainless Steel Fittings*


Alone or in combination these factors purchase-control every job
CONSULTING ENGINEERS
MECHANICAL CONTRACTORS
ENGINEERS in INDUSTRIAL PLANTS
ENGINEERS in LARGE BUILDINGS

Get through to each

to sell any product used in heating, piping, and air conditioning

Besides their undisputed control of purchasing in this field, what do these KEY factors have in common?

Collectively they are the reader-audience of Heating, Piping & Air Conditioning . . . and no other publication gets through to them like HP&AC. The fact that every copy is *paid for* gives the proof.

But the largest and only fully paid (ABC) circulation in the field isn't the only point in HP&AC's favor. It also leads its nearest rival by over 2 to 1 in advertising volume, carries more editorial pages by far, has more advertisers, and is used on an exclusive basis by more advertisers.

Conclusion: If you want truly ACTIVE and RESPONSIBLE help in getting through to your prospects, concentrate your advertising in HP&AC. It will meet *face-to-face* the engineers and contractors indicated above PLUS the field's important wholesalers and the original equipment manufacturers who are large-scale buyers of accessory products required in factory-built assemblies.

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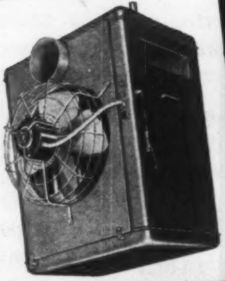
Heating, Piping & Air Conditioning
Air Conditioning Headquarters
KEENEY PUBLISHING CO., 6 N. MICHIGAN AVE., CHICAGO 2



HOW TO SOLVE THE 3 BIG PROBLEMS of Heating System Design

KEEP COSTS DOWN

The cost of Reznor unit heaters is comparable to or lower than that of other types of equipment of equal heating capacity. And with Reznor, this is the total cost. You don't have to add the costs of extensive piping and valves or duct work, and of radiators or registers. Reznor gas unit heaters produce and distribute heat at the point of need. To install them involves only suspension, venting and utility connections. So installation costs are much lower than those of central heating systems. Lower equipment cost . . . lower installation cost . . . two reasons why Reznor gas unit heaters can offer substantial savings on heating systems for so many commercial and industrial buildings.

SAVE SPACE

Reznor gas unit heaters are installed up at the ceiling, completely out of the way. When you design for a store or factory, you don't have to allot a single square foot of valuable space for heating equipment . . . and you don't have to keep floor or wall areas clear for radiators or registers.

INSURE FLEXIBILITY

When you specify Reznor gas unit heaters you don't have to choose between a heating plant which is over-sized and over-priced for current requirements and one which may not be adequate for future needs. With Reznor unit heating, when that new wing is added, additional heaters are installed. It's as simple as that. And in the case of internal remodeling, it's very easy and inexpensive to relocate the existing heaters.

ONLY REZNOR GAS UNIT HEATERS OFFER ALL THESE ADVANTAGES

- Clean, modern design, back as well as front . . . all controls and connections inside the cabinet.
- FlexiTemp control system with automatic two-speed fan control to provide nearly continuous air circulation and minimize temperature fluctuations (optional).
- No costly frills and gadgets . . . features which are needed only to meet special situations always separately listed and priced.
- Fan or blower models in ten sizes from 25 to 300 thousand BTU.

There is no "equivalent" for Reznor gas unit heaters.

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED
UNIT HEATERS
Reznor Manufacturing Company
51 Union St., Mercer, Pennsylvania

for complete details,
wherever you are . . .
Look for Reznor under "Heaters-Unit" in the Yellow Pages

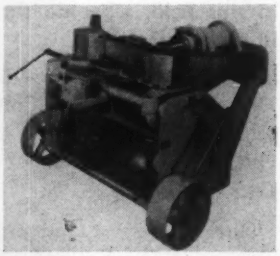
Div., Horace T. Potts Co., Dept. HPAC, 504 *Erie Ave., Philadelphia* 34.

Pipe expanded directly into insert flange to make leakproof connections, company says. Serrated insert said to hold pipe to eliminate its rotation in joint; flange is held to insert by lip that allows it to be pulled tightly against gaskets. Available in variety of sizes, types.

Bypass Valve . . .

. . . for regulating liquid pressure as supplied by pressure pumps — *Watts Regulator Co., Dept. HPAC, Lawrence, Mass.*

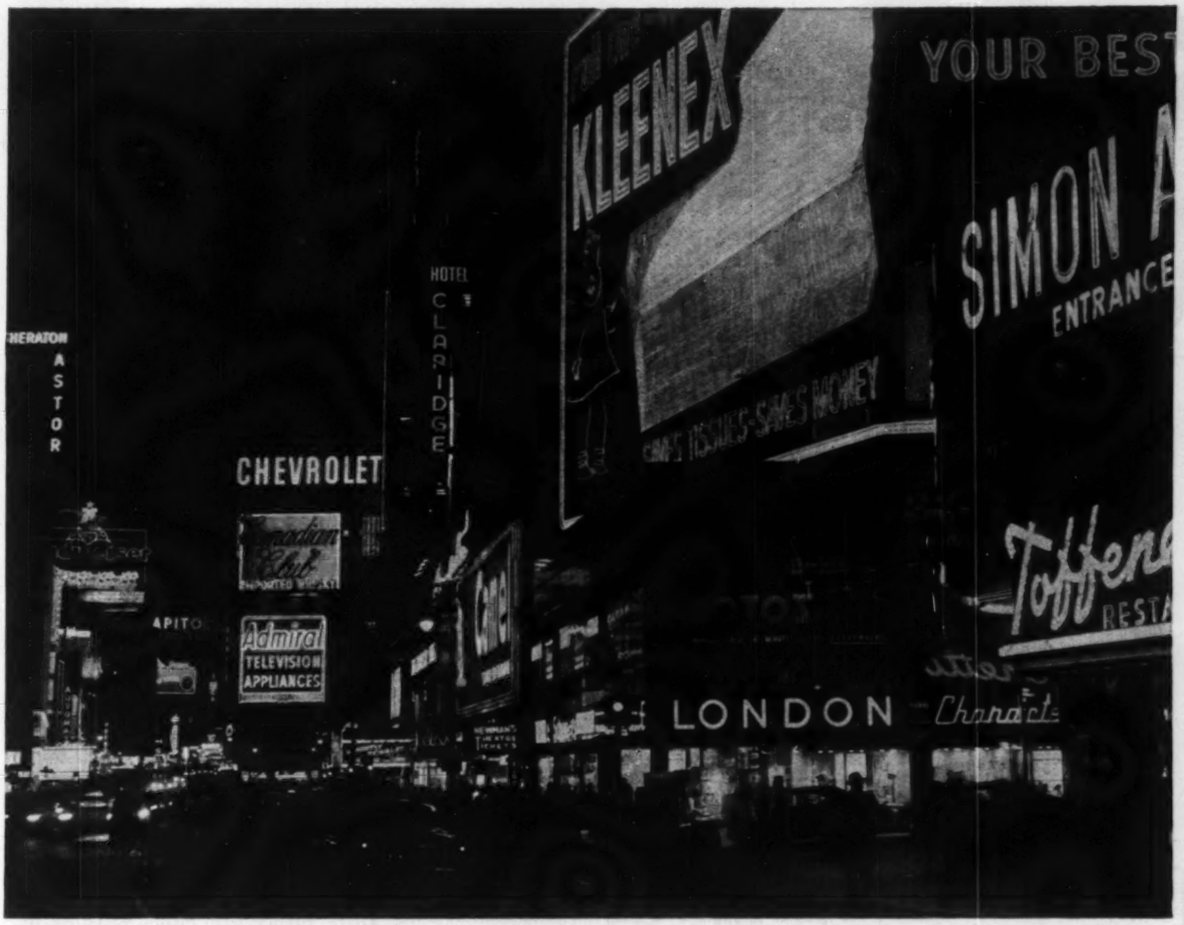
Unit set to open at required pressure; when system demand is reduced, excess liquid is bypassed back to supply. Unit has fixed setting for relief to atmosphere applications. Valve available in ¾, 1 in. sizes for pressures 10 to 25 psi.



Pipe Bender . . .

. . . designed to be taken to the job — *Wallace Supplies Mfg. Co., Dept. HPAC,* 1304 *Diversey Parkway, Chicago* 14.

Unit bends ¾ through 6 in. pipe, I-beams, channels, angles, similar structural shapes. Single hydraulic valve brings ram cylinder in and out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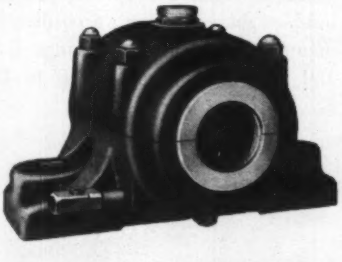
Bright Lights–That Never Fail



SLEEVOIL BEARINGS

Dodge Sleevoil Bearings are available in plain type or water-cooled. They are self-aligning. Can be drilled for thermostatic emergency warning if desired. Shaft sizes from 1-7/16" to 10".

The brilliant lights of Broadway match the stars in the certainty of their rising. A black-out from power failure is almost unthinkable.

One factor that contributes to the dependability of this steady power supply is the bearing that insures unfailing operation of mechanized draft in the generating plant.

These Bearings are Dodge Sleevoil.

Generating plants throughout America—including those in such metropolitan centers as New York, Detroit, San Francisco, Los Angeles—use these super-quality bearings.

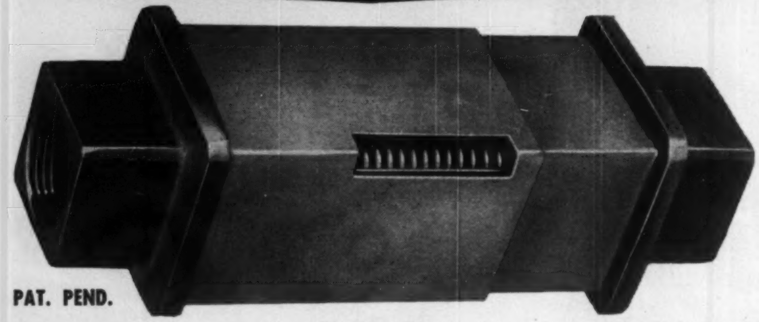
The Sleevoil Bearing is a Dodge development, created especially to meet the exacting requirements of fan and blower service. You are invited to write us for our new Engineering Catalog D56, which contains detailed description, sizes, dimensions.

DODGE MANUFACTURING CORP., 1600 Union St., Mishawaka, Indiana

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE
of Mishawaka, Ind.

Keflex
QUADRA-SIDE
Telescopic Expansion Compensators
WITH LAMINATED STAINLESS STEEL BELLOWS, 2 PLY OR MORE
. . *something new for the* ARCHITECT — ENGINEER — CONTRACTOR

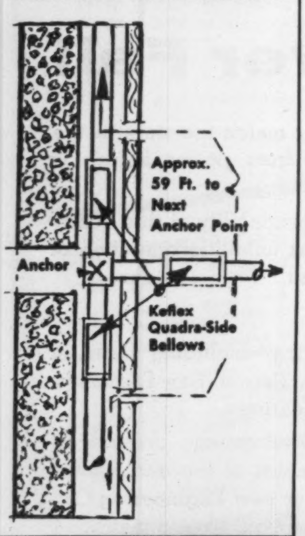


PAT. PEND.

TYPE 7Q SIZES 3/4"-3" Inc.

Working Pressure 300 P.S.I. — Temperature to 800°F. — Has Reserve Strength — Not Just Borderline Prospect of Withstanding Effect of Pressure — Shock — Thermal Line Expansion — High Temperature — Moderate Vibration. HIDDEN PROTECTION PLUS! All Non Corrosive Stainless Steel Bellows With Brass or Bronze End Fittings and Telescopic Shrouds.

KEFLEX FITS IN NARROWEST WALL SPACE—SAFE—PERMANENT


Approx. 59 Ft. to Next Anchor Point
Anchor
Keflex Quadra-Side Bellows

● **ROUND** KEFLEX Bellows are made of Laminated Stainless Steel, multiple ply (usually 2 ply or more) for greater strength with minimum force required to move bellows. The minimum force to move 7 Q Keflex Bellows greatly reduces the need for additional anchoring above that required to handle line pressure thrust force as the force to move Keflex 7 Q only is always less than 100 lbs.

● **FLAT** KEFLEX FLAT GUIDES offer so many advantages it is difficult to mention them all. Briefly: The KEFLEX FLAT OUTSIDE GUIDE (shroud) is made of brass USUALLY formed square of required length —one unit end will telescope over other unit end. The flat surfaces slide over and in one another—practically eliminating possibility of torque as result of faulty installation. This ASSISTS PROPER GUIDING.

● **SQUARE** KEFLEX SQUARE END FITTINGS are made of heavy, non-porous, square, bronze stock, and threaded tapered female pipe size. They are attached to the KEFLEX 7 Q bellows and the outside guides by silver brazing. The result is an easy moving expansion joint that will absorb either the slightest or the greatest thermal pipe expansion and with practically no load on the anchors. The heavy bronze ends, which will not crush during normal installations, assures safe and leakproof joints.

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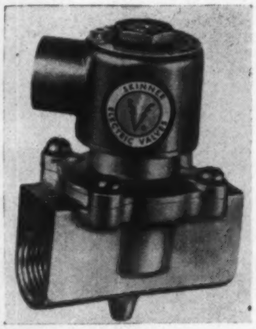
U. S. FLEXIBLE METALLIC TUBING CO.
SINCE 1905
KEFLEX MANUFACTURING DIVISION
454 EAST THIRD STREET, LOS ANGELES 13, CALIFORNIA
SAN FRANCISCO 5 63 MAIN ST.
PORTLAND 9, OREGON 328 N.W. BROADWAY
SEATTLE 4, WASHINGTON 2425—6TH AVE. S.

EQUIPMENT DEVELOPMENTS
Continued

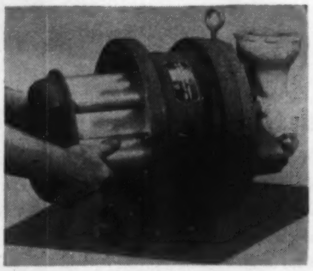
of bending position; pipe or other shape to be bent is place in support blocks. Hydraulically operated ram moves forward pushing against part in die blocks causing it to bend to desired radii, company says. Covers floor space 7 ft 9 in. × 7 ft 6 in.; weighs 9700 lb.



Solenoid Valve . . .

. . .designed to permit full flow of air, water, oil, other common media — *Skinner Electric Valve Div., Dept. HPAC, 105 Edgewood Ave., New Britain, Conn.*

New units are two-way, normally closed, pilot operated; weigh 1¾ lb, stand 3 31/32 in. high, provide full ½ in. orifice with either ⅜ or ½ in. pipe taps, company says. Only small area of new, completely supported diaphragm is exposed to pressure; synthetic insert shockproof, provides bubbletight operation, according to manufacturer. Pressures range 5 to 150 psi; temperatures −40 to 180 F.



Meter Conversion Kit . . .

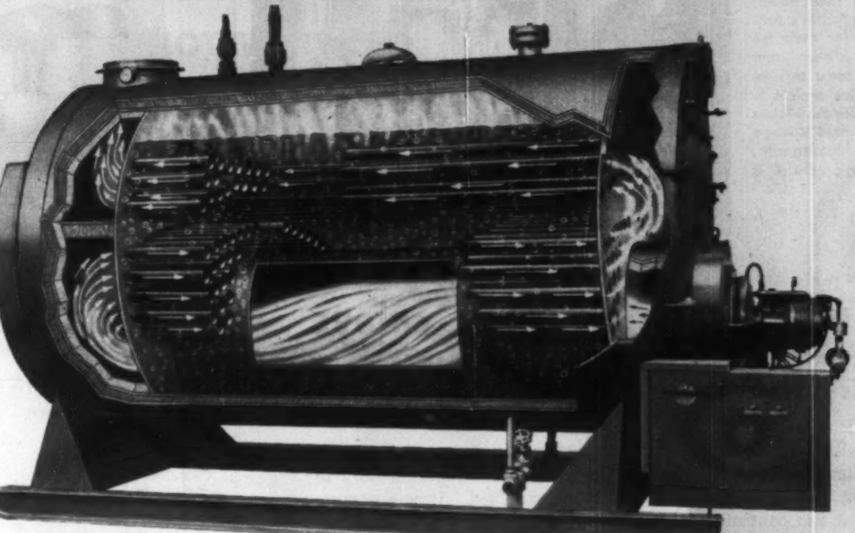
. . .for liquid meters — *Meter and Valve Div., Rockwell Mfg. Co., Dept. HPAC, 400 N. Lexington Ave., Pittsburgh 8.*

Kits—consisting of new crank con-

Send for up-to-date information on

WEBCO-RAY

3 pass packaged units



- 80 plus percent efficiency
- Forced Draft and Induced Draft models
- Sizes from 10 to 600 hp
- Factory packaged for fast hook-up
- Hinged front and rear doors for easy maintenance

Webco-Ray three-pass packaged heating, power or process steam units offer optimum efficiency and performance at low cost. Boilers by Webco, feature large furnace volume for high radiant heat transfer, longer life, low maintenance and quiet operation. World famous Ray burners are standard equipment on all Webco packaged units, guaranteeing reliable, economical combustion. Other advantages of Webco-Ray units include: hinged front and rear access doors for easy maintenance; complete factory-packaging for economical hook-up on the job; and fast local service from the Ray and Western dealer network.

WEBCO
3 PASS PACKAGED UNITS
RAY

WESTERN BOILER COMPANY
1600 North Indiana Street
Los Angeles 63, California

4657

CALL OR WRITE FOR COMPLETE CATALOG ON WEBCO-RAY UNITS

Western Boiler Company
1600 North Indiana Street
Los Angeles 63, California

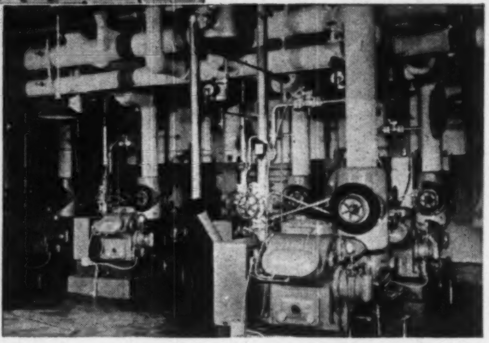
Name____

Company______________________________________

Address_______________________________________

City__________________________State____________

Famous Neil House of Columbus, Ohio, chooses Vilter Air Conditioning to provide their guests with controlled comfort year 'round.



Shown are the five Vilter six-cylinder ammonia compressors which provide most of the refrigeration. Other Vilter equipment includes: evaporative condensers, Pakicer, for their ice requirements in kitchen and bottle beverage room service, shell and tube brine coolers to supply cold brine for the kitchen refrigerators and cold storage rooms, and air conditioning units. Complete automatic control is provided.

Famous Convention Hotel Enjoys VILTER Air Conditioning

● The Neil House, one of the outstanding convention hotels of the nation located in Columbus, Ohio, believes wholeheartedly in the drawing powers of air conditioning. A satisfied Vilter customer since 1939, it has continued, through the years, to extend its air conditioning facilities . . . Vilter units being specified in each case.

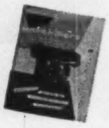
Prominent among Vilter equipment are the feature-packed VMC ammonia compressors which are installed in the power plant across the street—their compact design insures more capacity in less space . . . assure lower maintenance cost because of interchangeability of components . . . provide efficient, economical performance, guaranteed for a long life. Your refrigeration dollar buys more in a Vilter VMC.

Installed on the roof of the power plant are Vilter Evaporative Condensers. They save you 90 to 95% in water costs . . . provide low pumping costs, eliminate waste water disposal problems, and may be installed indoors or out. Vilter Evaporative Condensers mean lower cooling costs.

See your nearest Vilter distributor for engineering assistance in designing an air conditioning and refrigeration system to your needs.

Write to The Vilter Manufacturing Company,
Dept. F-704, 2217 S. First Street,
Milwaukee 7, Wisconsin,
for helpful literature.

Bulletin 732
Vilter Evaporative
Condensers



Bulletin 631
Vilter
Uni-Chillers

Bulletin 429
Vilter VMC
Freon Compressors

Vilter®

REFRIGERATION and AIR CONDITIONING

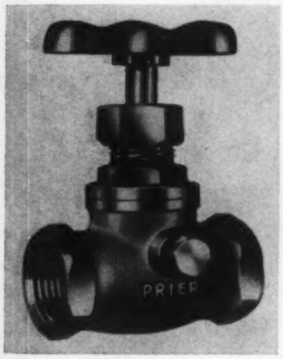
THE VILTER MANUFACTURING COMPANY, Milwaukee 7, Wisconsin

Air Units • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Water & Brine Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pipe Coils • Valves & Fittings • Pakice & Polarflake Ice Machines

EQUIPMENT DEVELOPMENTS

Continued

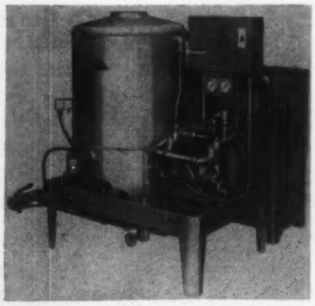
trolled rotor measuring assembly—designed for easy installation in all No. 4, 5, 6 models now in field. Features cited: 20 percent greater measurement capacity; greater life expectancy; quiet operation; permanent timing; fewer moving parts.



Valve Patterns . . .

. . . in new "Junior" line of 10 stop, stop and wastes, sediment, sill types —*Prier Brass Mfg. Co., Dept. HPAC,* 7801 *Truman Rd., Kansas City* 22, *Mo.*

Sizes are: stop and stop and wastes — ½ and ¾ in. IPS; stops and stop and wastes — ½ and ¾ in. sweat; male sediment faucet — ½ in. IPS; sill faucet — ½ in. IPS. Features of each valve: stuffing box, bronze body, neoprene washer, asbestos packing, lacquered handle.



Steam Cleaner . . .

. . . designed for contractors and industrial plants — *Clayton Mfg Co., Dept. HPAC,* 401 *N. Temple City Blvd., El Monte, Calif.*

Great versatility of cleaner attributed to new "Fleximatic Control"

NEW IMPROVED

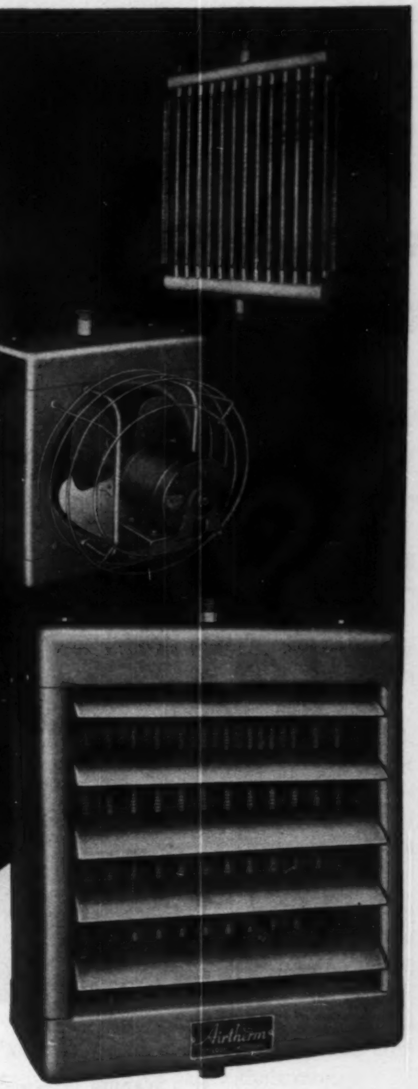
Airtherm

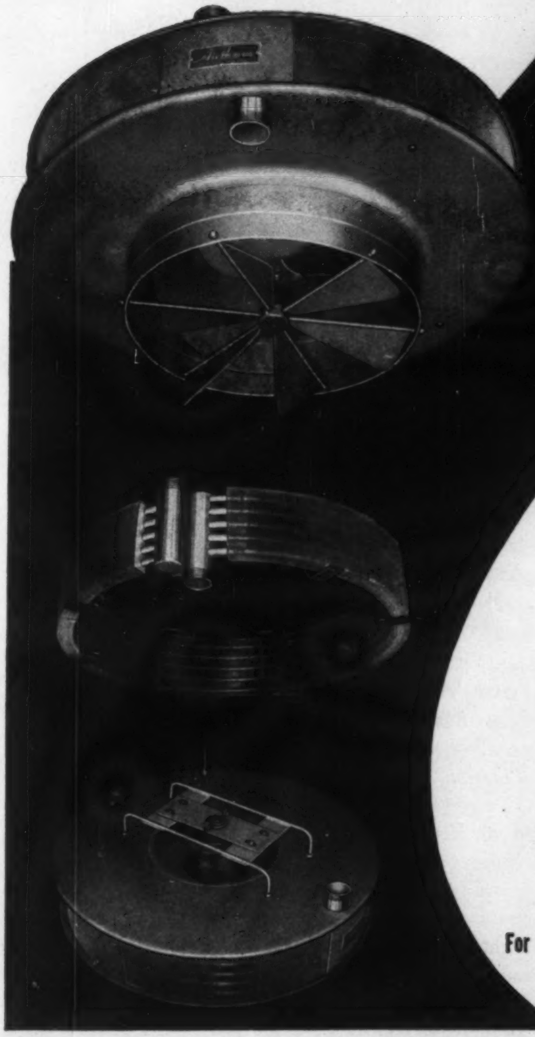
PROPELLER FAN

UNIT HEATERS

FOR STEAM OR HOT WATER

A SIZE FOR EVERY REQUIREMENT





The new Airtherm line incorporates 22 completely redesigned vertical units and 24 improved horizontal units, ranging from 18,000 to 555,000 BTU per hour, with a choice of outlet diffusers to cover practically every air distribution pattern and mounting height. Silent operation is assured by resiliently mounted motors, properly designed fans and casings, and attention to face and outlet velocities. All fans are expertly positioned, balanced and tested. Each unit is tested and rated for performance in strict accordance with the Standard Test Code of the industry. Only brand name, continuous duty motors, especially made for the purpose, are used and mountings are designed for efficient cooling and easy servicing. Rugged coils are formed by hydraulically expanding copper tubing into plate type aluminum fins, each with its own collar, providing increased heat transfer and wide, even spacing to reduce clogging. All coils are tested and tagged for 500 p.s.i. hydrostatic pressure. Casings are phosphatized to insure a long, rust-free life for the attractive baked enamel hammer tone finish.

For Complete Specifications Including a Guide for Selection and Application, Write:

AIRTHERM MANUFACTURING CO.
702 S. SPRING AVE. • ST. LOUIS 10, MO.

Aladdin
AIR HANDLING EQUIPMENT

TYPE
"EX"
INDUSTRIAL
EXHAUSTER

ALADDIN Industrial Exhaust Fans are all-welded steel plate construction. They are ideal for material handling such as conveying grains, shavings and sawdust, or for dust removal from grinding of buffing wheels. The EX fan is also the first choice for many jobs where fumes, hot air or gasses must be handled by a rugged, efficient, dependable fan.

- **RUGGED**
- **EFFICIENT**
- **DEPENDABLE**

Write for complete data A5-58

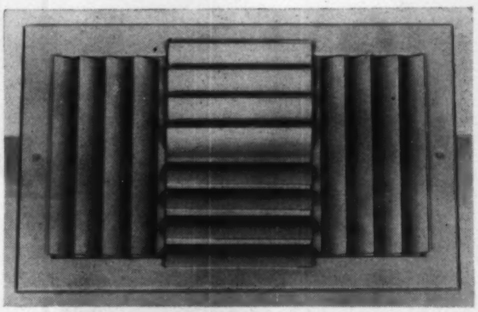
ALADDIN HEATING CORPORATION
1111 WEST AVENUE 137 · SAN LEANDRO, CALIFORNIA

feature which automatically regulates fuel to burner and water flow to coil, permitting operator to select, use all or any part of 280 gph capacity from one or two guns, company says. Vapor expansion controlled for concentrated, high velocity delivery through vacuum nozzle, providing high impact for heavy duty industrial cleaning.

Electronic Air Cleaners . . .

. . . designed for increased efficiency, decreased size — *Minneapolis-Honeywell Regulator Co., Dept. HPAC, Wabash, Ind.*

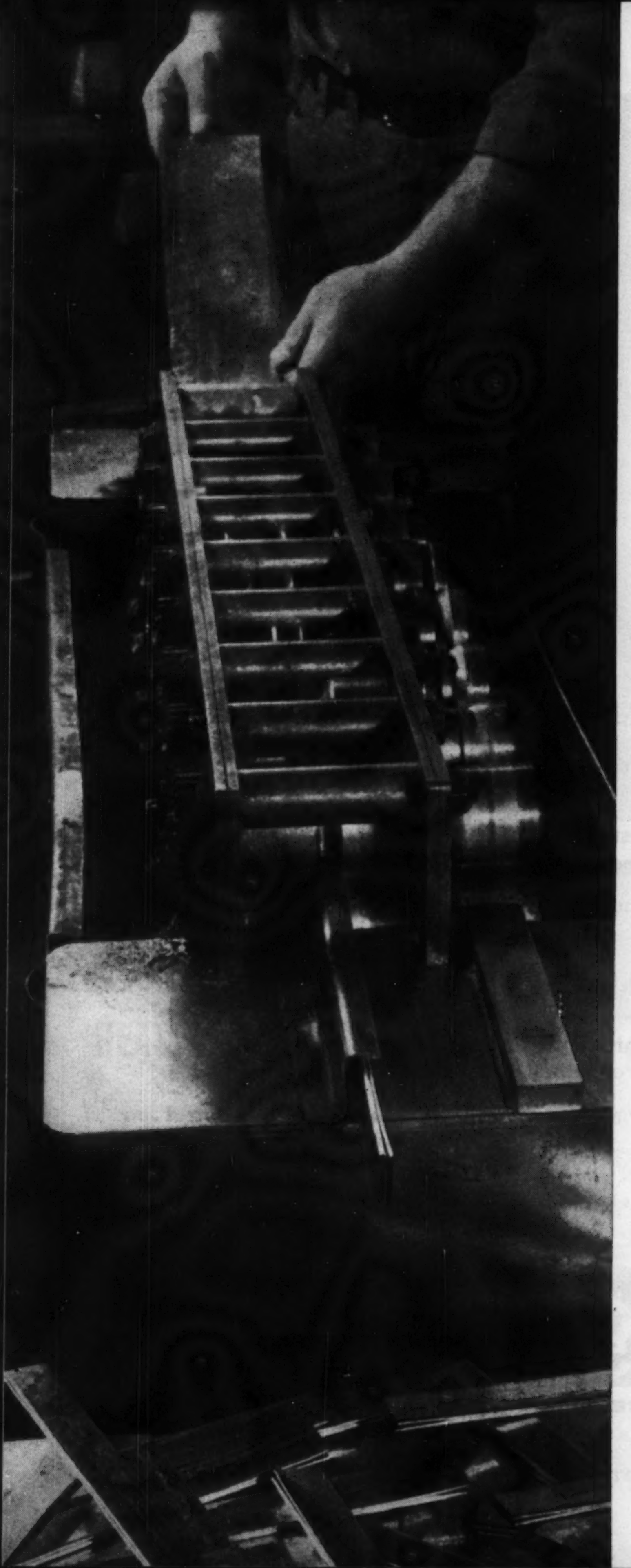
"AC/ME" unit available in four models. New 10,000 cfm cleaner requires 20 sq ft of space, will remove 90 percent of all dirt particles down to 0.001 micron in size, says manufacturer. Company recommends use with "Renew-Air-Filter", a 2 x 2 ft filter, containing 45 lb granulated activated cocoanut charcoal.



Four-Way Registers . . .

. . .with adjustable curved louvers of extruded aluminum — *Waterloo Register Co., Inc., Dept. HPAC, Waterloo, Iowa.*

Louvers can be arranged to provide four-way flow of air from one register. Complete product line includes grilles, registers for one-way flow either horizontal or vertical, simultaneous two-way flow horizontal or vertical, three-way flow, horizontal to the right and left and either up or down from center group louvers. Straight, adjustable, extruded aluminum louvers may be furnished mounted behind curved louvers to increase control over air flow, manufacturer says.



"Short-radii bends?

WEIRKOTE'S®

zinc coating

thrives on 'em!"

Weirkote's ability to take punishment is a big reason so many fabricators are so enthusiastic about it.

Look at the "S" cleat fabrication at the left, for example. It's about as ornery a job as you can face. Yet Weirkote makes it easy.

You can bead it, crimp it, twist it, draw it, work it to the limits of the steel itself. Doesn't matter what the job or how demanding it is. Weirkote's continuous process integrates the zinc and the steel so that the most complicated forming operations are made without chipping or peeling.

And *now* Weirkote is treated to inhibit wet storage (white oxide) stain. Your finished product has the enduring anti-rust protection you want it to have. You save yourself a lot of rejects, a lot of annoyance. Your costs, from purchase of Weirkote through fabrication, are pleasingly low. Your customers get even more value for their money.

Weirkote may help *you* to make an even better product at an even lower cost. For free 12-page booklet of facts and technical data, write to Weirton Steel Company, Department M-9 Weirton, West Virginia.

WEIRTON STEEL COMPANY

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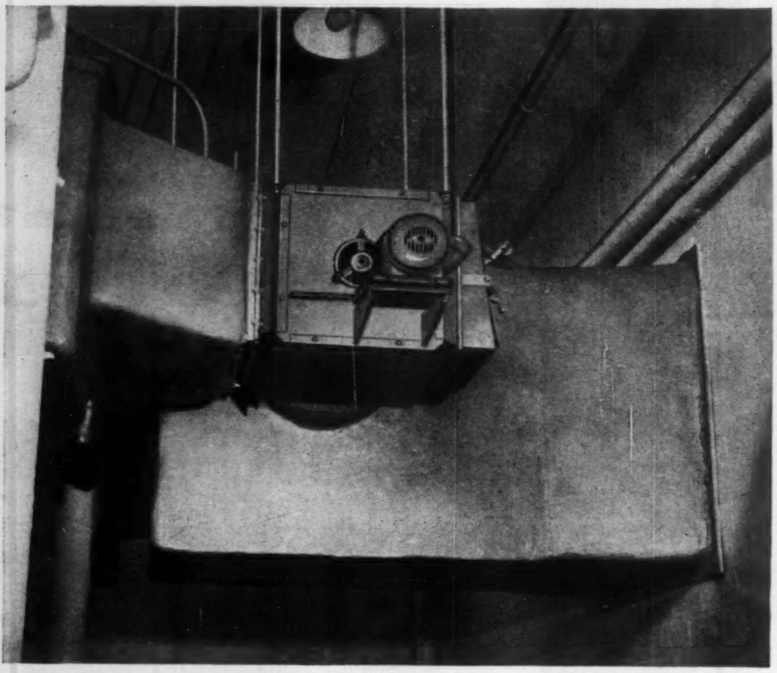
a division of

NATIONAL STEEL CORPORATION



Do you like to save money?

That's just what you do the minute you install a Wing Draft Inducer.

First, you save money in capital investment, because no tall, unsightly, expensive stack is needed.

Next, of course, you save money by the elimination of stack maintenance.

Then, you save money on fuel, because you get complete combustion with a Wing Draft Inducer.

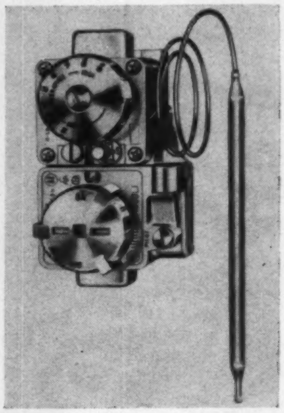
And finally, you save money by uninterrupted boiler operation, freed from the uncertainties of natural draft.

If *you'd* like to save money, send for a copy of Wing Draft Inducer Bulletin No. I-57.

L. J. Wing Mfg. Co. 140 Vreeland Mills Road · Linden · N. J.
DIVISION OF AERO SUPPLY MFG. CO. INC.

Wing
DRAFT INDUCERS

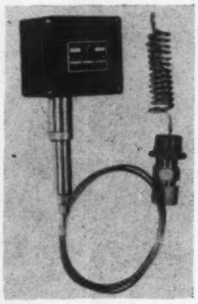
FANS • UNIT HEATERS • DRAFT INDUCERS • BLOWERS • TURBINES



Heating Control . . .

. . . in packaged unit for space heating — *Robertshaw-Fulton Controls Co., Grayson Controls Div., Dept. HPAC, 100 W. Victoria Blvd., Long Beach, Calif.*

"Unitrol 1000" combines A and B gas cocks, automatic pilot, pilot filter, pilot flow adjuster, thermostatic 24 volt electrically operated gas valve, pressure regulator in one unit.



Temperature Control . . .

. . . designed for use on air conditioning units — *United Electric Controls Co., Dept. HPAC, School St., Watertown, Mass.*

New "F7" composed of remote bulb thermal device, control head with connecting capillary tube of varying lengths. Bulb exposed to source to be controlled. Connecting capillary tube leaves control head — with its attached bellows — free to be placed away from source that is to be controlled, company says. Head compensation provided effective in range −65 to 160 F. Models have

THE BIG ONES COME TO **BURNHAM**

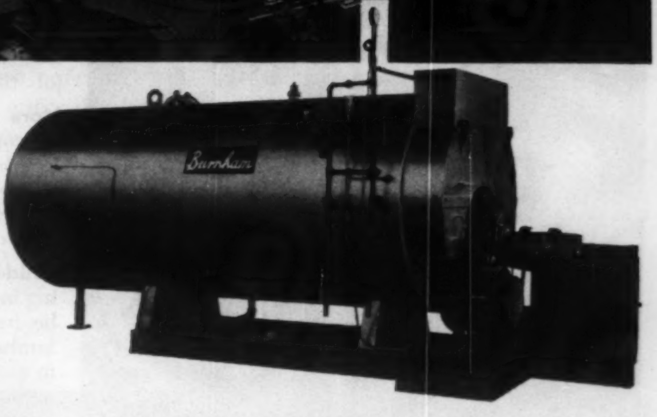
LATHAM CORNERS SHOPPING CENTER, ALBANY, N. Y.

HOWARD T. FISHER & ASSOC. / W. O. BIERNACKI-PORAY & ASSOC. ... *Architects*
SIDNEY W. BARBANEL .... *Mechanical Engineer*
THE J. M. FINK COMPANY, INC. .... *Heating Contractor*

5 BURNHAM STEEL BOILERS HEAT THIS HUGE SHOPPING CENTER

This outstanding shopping center uses 3 packaged Scotch Type Boilers, one Standard Scotch Type Boiler and one Compact Type popular Burnham welded Steel Boiler, standard for over 25 years. The Scotch Type Boiler and combustion unit (see illustration) were teamed after consultation with many experts plus extensive testing. The result . . . a fine Burnham Boiler with the finest and most suitable combustion unit. Scotch Type, capacities 2,600 to 35,000 sq. ft. E.D.R. steam and 4,680 to 56,000 sq. ft. E.D.R. water Net S.B.I. ratings. Compact Type 2,600 to 35,000 sq. ft. E.D.R. steam. Comparable ratings for water, all S.B.I.

Stock Boilers Available for Prompt Shipment



Burnham Corporation

Steel Boiler Department
Irvington, New York
Sales Representatives throughout the U.S.A.

Burnham Corporation HP-38
Steel Boiler Dept.
Irvington, New York

Please give me, without obligation, full ratings and data on:
Scotch Type Boilers ☐ Boiler-Burner Packages ☐ Compact Boilers ☐

Name ....
Address ....
City .... State ....

PARTIAL VIEW of Rockledge Homes, Abington Township, Penna. All 106 homes have Anaconda copper tube sanitary drainage lines.

"I do a better job at lower cost—with Copper"

J. L. FITZPATRICK of J. L. Fitzpatrick & Sons, Jenkintown, Penna., plumbing contractor for Rockledge Homes development, watches journeyman Sam Duper, Jr., connect a 3-inch copper tube soil line from bathroom to the stack. Anaconda Tube for the development was supplied by Fleck Company, Elkins Park, Penna., plumbing supply wholesaler.

J. L. Fitzpatrick switched to Anaconda copper tube for sanitary drainage lines—finds installation easier — gives builders and homeowners superior plumbing systems.

"We all know that copper plumbing is best and there's no mystery about the cost angle," said J. L. Fitzpatrick.

"It is simply a matter of copper tube and solder-joint fittings being so much easier and faster to install. Copper handles right. . . . It's light and easy to cut. And where you have long runs, the 20-foot lengths of copper tube eliminate many joints. We also save the time and trouble of making threaded or caulked connections.

"And our men like to work with copper, not only because it's easier—but because they can turn out a neat, trim job they're proud of."

More and more plumbing contractors are standardizing on copper tube for drainage lines for the reasons given by Mr. Fitzpatrick. And in areas where plumbing codes were written years ago, contractors are asking for revisions to include copper tube as an approved material for sanitary drainage systems.

Builders and owners also benefit from all-copper plumbing in many ways. A 3" copper tube stack with fittings can be installed in standard 4"-wide partitions. Carpentry, lumber, and space are saved. Plumbing can be laid out to meet owners' wishes regarding location of fixtures and appliances. All-copper plumbing is a mark of quality—a sign of low maintenance and high resale values.

Write for descriptive literature on ANACONDA ALL-COPPER plumbing. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 5801

ANACONDA®
COPPER TUBE and FITTINGS
Available through plumbing wholesalers
Made by
THE AMERICAN BRASS COMPANY

adjustable ranges —150 through 650 F, on-off differentials of about 1.0 to 2 F.

Pipe Groover . . .

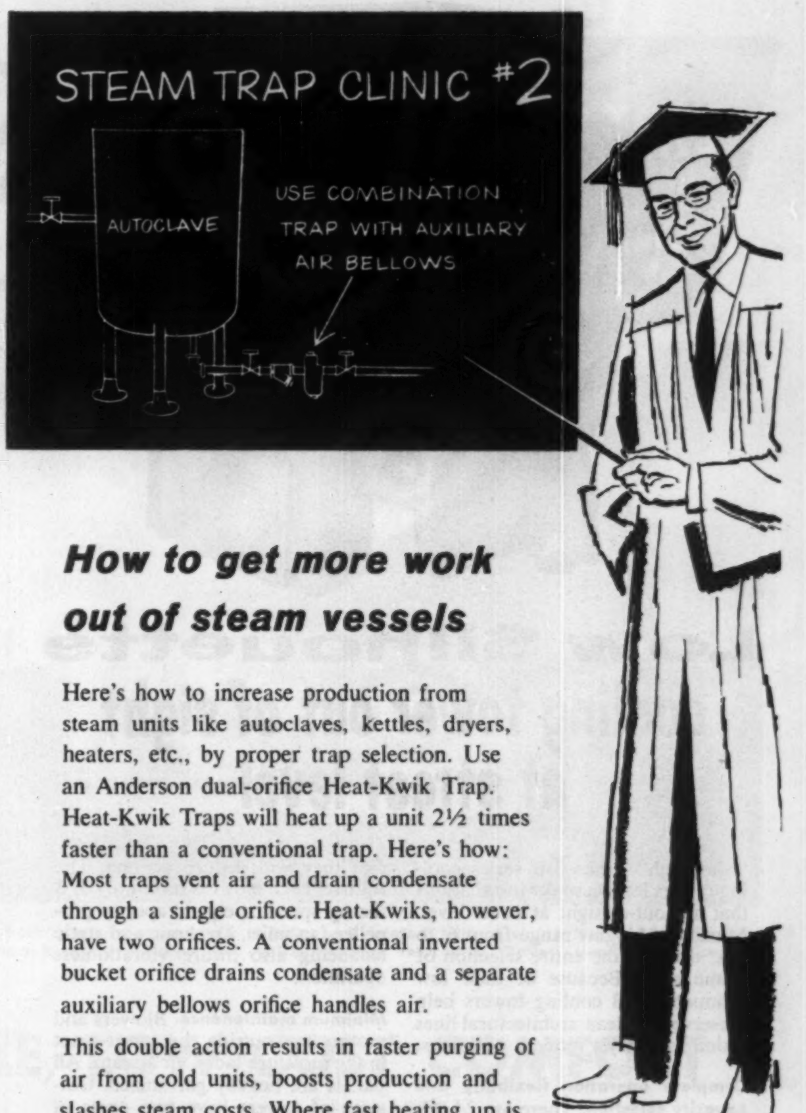
. . . for lightweight pipe, tubing — *Victaulic Co. of America, Dept. HPAC, Box 509, Elizabeth, N. J.*

"Vic-Easy" series "100," "200" portable tools for use on job or in shop adjustable 1¼ through 12 in. diameters. Series "200" constructed for continuous duty on heavier wall thicknesses. Series "100" is lighter machine intended for occasional job on lighter wall thicknesses. Either tool may be used on light wall steel, stainless steel, aluminum pipe or tubing.

Flexible Shaft . . .

. . . designed to allow complete visibility of cutting, beveling operations — *H & M Pipe Beveling Machine Co., Dept. HPAC, 311 E. Third, Tulsa, Okla.*

Unit made from length of flexible tubing with crank handle attached to one end of tubing and other end attached to crank pinion on machine. As operator turns crank, ring gear is put in motion and torch begins its revolution around pipe. Operator may stand in any position, observe cut through full circumference of pipe, manufacturer says.

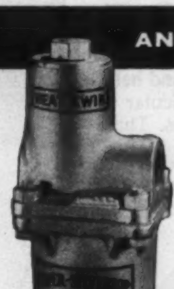

STEAM TRAP CLINIC #2
AUTOCLAVE
USE COMBINATION TRAP WITH AUXILIARY AIR BELLOWS

How to get more work out of steam vessels

Here's how to increase production from steam units like autoclaves, kettles, dryers, heaters, etc., by proper trap selection. Use an Anderson dual-orifice Heat-Kwik Trap. Heat-Kwik Traps will heat up a unit 2½ times faster than a conventional trap. Here's how: Most traps vent air and drain condensate through a single orifice. Heat-Kwiks, however, have two orifices. A conventional inverted bucket orifice drains condensate and a separate auxiliary bellows orifice handles air.

This double action results in faster purging of air from cold units, boosts production and slashes steam costs. Where fast heating up is required, always insist on Heat-Kwiks.

ANDERSON HEAT-KWIK STEAM TRAPS

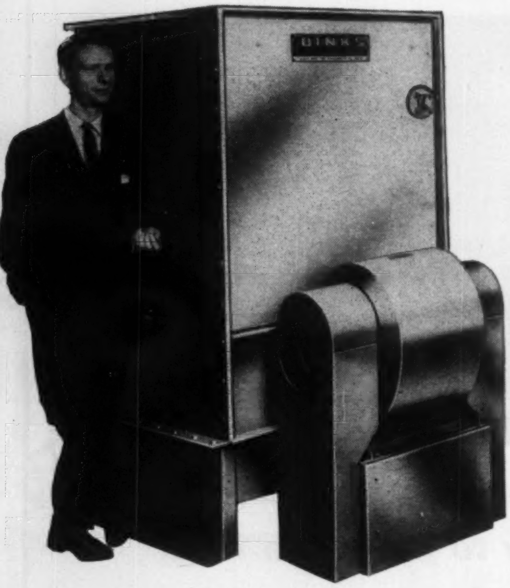


THE V. D. ANDERSON COMPANY
division of International Basic Economy Corporation
1949 West 96th Street • Cleveland 2, Ohio

Please send information on how to get more heat from steam units with your Heat-Kwik Traps.

Name ______________ *Title* ________
Company ______________________
Address ______________________
City ____________ *Zone* ___ *State* ______

Heats Up Production Units 2½ Times Faster



Low Silhouette
cooling tower out of sight
at street level

"Man-high" Binks 3-B series cooling towers let you make installations that are out-of-sight at street level. Maximum heights range from 6' to 7½' through the entire selection of frame sizes. Because of their low silhouette, 3-B cooling towers help preserve the clean architectural lines found in today's modern buildings.

Complete operation flexibility and capacity selection. There are 24 different cooling towers in Binks 3-B series—a wide range of refrigeration capacities. Individually powered blowers on multiple blower towers permit complete operation flexibility for most efficient cooling under varying load and weather conditions.

Whisper-quiet operation. Binks 3-B cooling towers operate so quietly they give you complete freedom in establishing their location. Put them adjacent to windows or in building wells, with complete confidence that they will disturb no one. The squirrel cage blowers have only 1/3 the tip speed of equal capacity propeller fan units. Dynamic and static balancing also insure vibrationless operation.

Minimum maintenance. Blowers and motors are outside the tower—not in the moisture laden air stream. All panels are heavily galvanized. Outsides of towers have two coats of aluminum paint. The insides are protected by a durable zinc chromate coating.

Send for complete data. Ask your Binks Branch Office, or write direct for a copy of Bulletin 477-A and 333. Binks engineers will be glad to answer your questions and help solve your particular cooling problems. There is no obligation.

7802

Binks
EVERYTHING FOR WATER COOLING

A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

Binks Manufacturing Company
3118-38 Carroll Ave., Chicago 12, Ill.

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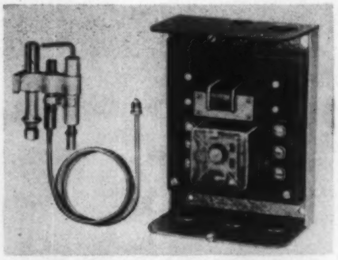
EQUIPMENT DEVELOPMENTS

Continued



Flame Safety Control . . .

. . . for medium size commercial gas burners — *General Controls Co., Dept. HPAC,* 801 *Allen Ave., Glendale* 1, *Calif.*

New combustion safety relay employs two operational principles: magnetic amplification, thermoelectric energy. "Hi-Speed" thermocouple responds to flame in 5 sec or less, says manufacturer. Magnetic amplifier has no vacuum tubes nor moving parts, operates switching relay in response to signal from thermocouple.

Inspection Telescope . . .

. . . for inspecting inside of pipe, other equipment — *Eder Instrument Co., Dept. HPAC,* 2293 *Clybourn Ave., Chicago.*

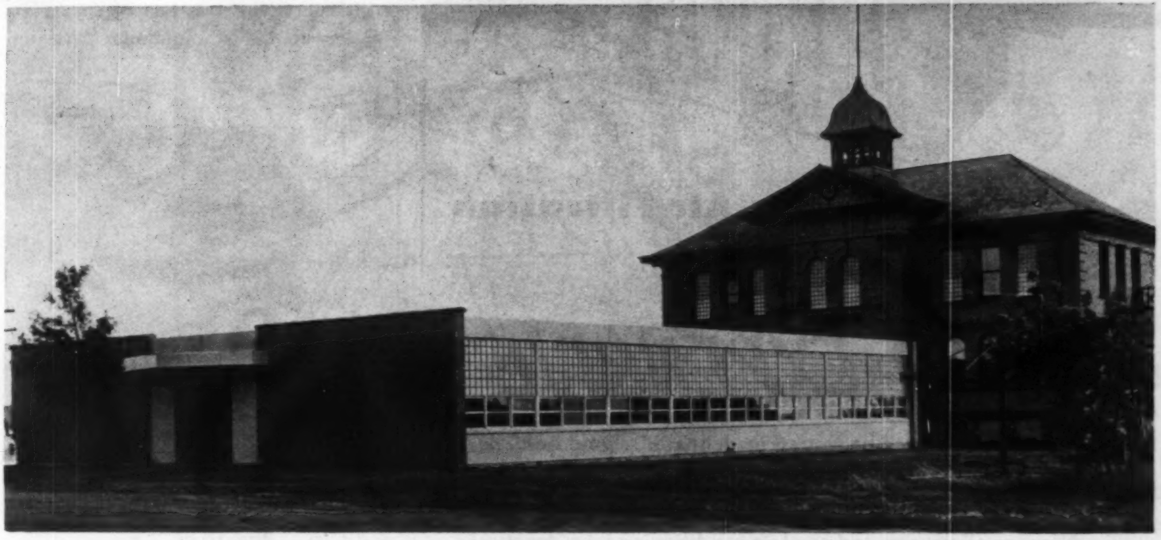
Lens bulb shoots concentrated beam of light into hole too small to insert light probe, company says. Mirror, ⅛ in. diameter, available for side viewing holes 0.125 in. up. Side viewing adapters available with diameters of 0.123 to 0.500 in.

Detector Kit . . .

. . . designed to permit prompt determination of weight of lead present in measured volume of air — *Mine Safety Appliances Co., Dept. HPAC,* 201 *N. Braddock Ave., Pittsburgh.*

Campbell

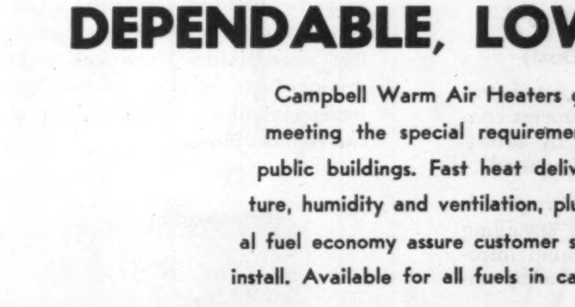
WARM AIR HEATERS FOR LARGE BUILDINGS



Cleveland School, Cleveland, N.D. — both new section and old building are heated with a single No. 8125 stoker fired Campbell Heater. Architect, Gilbert R. Horton, Jamestown, N.D.; Heating contractor, Valley Heating Service, Valley City, N.D.

DEPENDABLE, LOW COST COMFORT

Campbell Warm Air Heaters give you many extra advantages for meeting the special requirements for heating schools and other public buildings. Fast heat delivery, positive control of temperature, humidity and ventilation, plus quiet operation and exceptional fuel economy assure customer satisfaction. Low in cost. Easy to install. Available for all fuels in capacities to 3,150,000 BTUs.

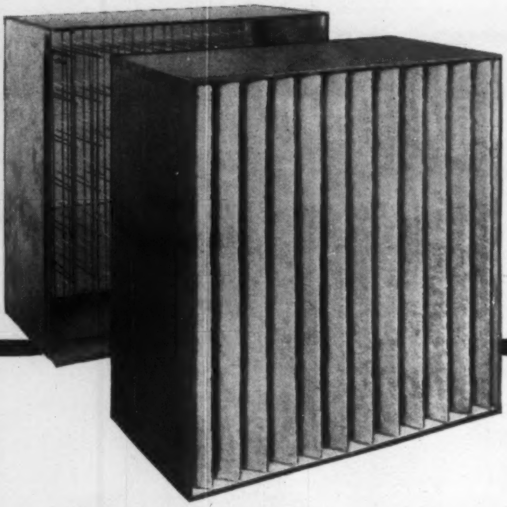


MANUFACTURERS' AGENTS

We have some very attractive openings for men calling on heating contractors and architects.

CAMPBELL
HEATING COMPANY

DES MOINES 17, IOWA



High-Efficiency Air Filtration is No Longer TOO EXPENSIVE

You no longer need accept an inadequate "second best" because of high cost of high-efficiency air-cleaning equipment. Cambridge Aerosolve® Filters are available at only a fraction of the cost of other high-efficiency equipment. Now, on all process and comfort conditioning jobs, practical consideration can be given to filters that are effective on the atmospheric dust which they will be required to remove — not just on an artificial (large particle) test dust.

Efficiency Range, 35% to over 90%
(N.B.S. Discoloration Test, Atmospheric Dust)

All Aerosolve cartridges fit the same cadmium-plated permanent frames, so that changes in supply-air or process conditions can be met with minimum cost, simply by substituting cartridges of higher or lower efficiency as required.

No water, oil, electric or drain connections are required, and only one building trade is involved in installing Aerosolve filters. There is no maintenance beyond infrequent cartridge replacement, which is quickly done by unskilled labor.

These are positive, trouble-free filters with the lowest initial pressure drop, 0.16" to 0.35" wg., of any strainer-type filter of comparable efficiency.

Write for Bulletin 120

Cambridge Filter Corporation
732 E. Erie Blvd., Syracuse 3, N. Y.

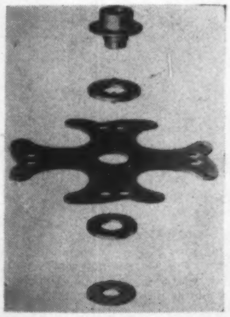
Also Makers of the Famous ABSOLUTE® Filter — World's Most Efficient Air Cleaning Device

REPRESENTATIVES IN PRINCIPAL CITIES

EQUIPMENT DEVELOPMENTS

Continued

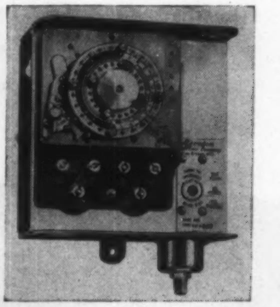
Spot test color comparisons reflect concentrations of lead either below or above maximum allowable concentration of 0.20 milligrams per cu meter, company says. Included in kit: "M-S-A" 500 ml pump; two boxes of glass fiber filter discs; pair of tweezers for handling filter discs; kit containing two sets of reagents; color standards; aluminum carrying case.



Resilient Fan Hub . . .

. . . designed to combine noise reduction with highest available starting torque rating — *Torrington Mfg. Co., Dept. HPAC, Torrington, Conn.*

Unit withstands 20 in. lb of starting torque; said to provide commercially acceptable noise level. Design properties listed by company for new hub include: Increased axial stability; more positive drive with eight driving lugs engaging spider, hub retainer; uniform compressibility of two resilient pieces.

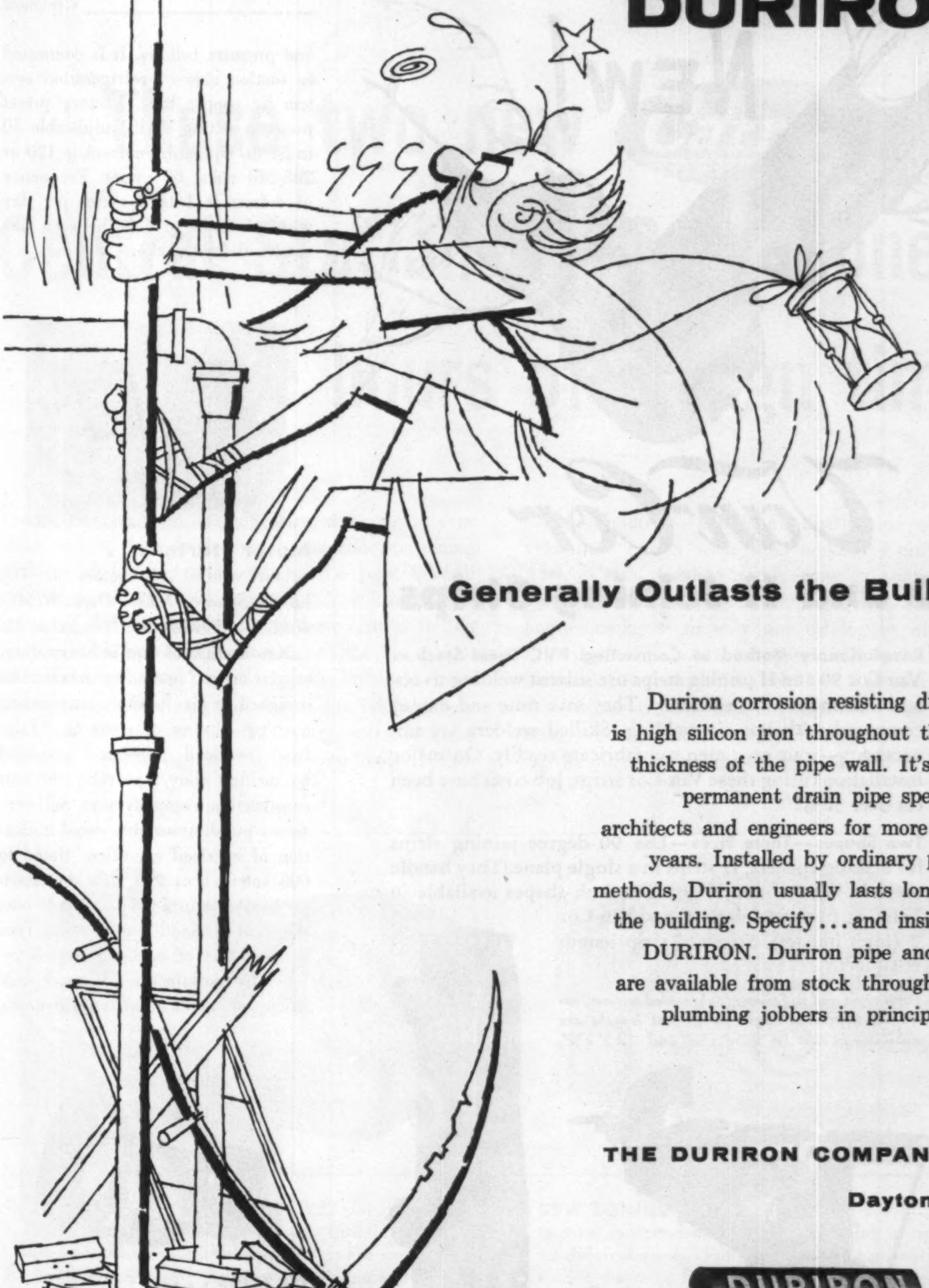


Time Controls . . .

. . . for electric heat, hot gas, compressor shutdown defrosting — *Paragon Electric Co., Dept. HPAC, Two Rivers, Wis.*

Unit is combination time control

DURIRON®



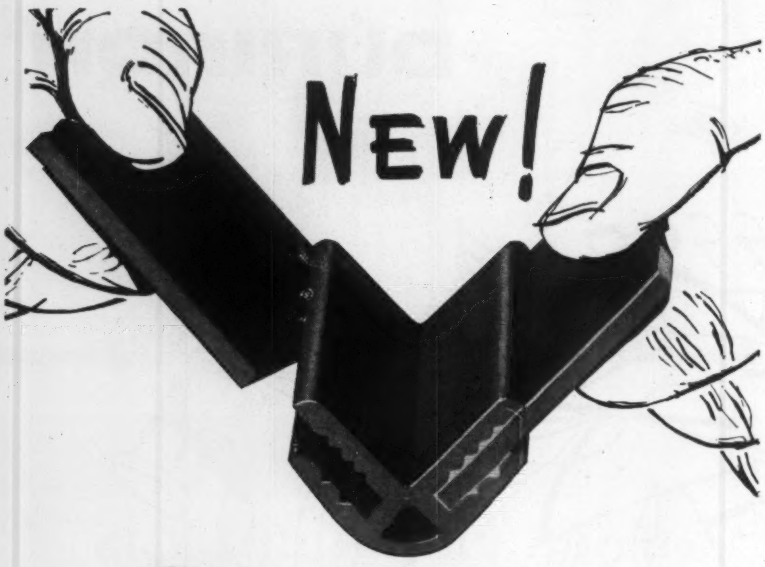
Generally Outlasts the Building

Duriron corrosion resisting drain pipe is high silicon iron throughout the entire thickness of the pipe wall. It's the one permanent drain pipe specified by architects and engineers for more than 30 years. Installed by ordinary plumbing methods, Duriron usually lasts longer than the building. Specify . . . and insist on . . . DURIRON. Duriron pipe and fittings are available from stock through leading plumbing jobbers in principal cities.

THE DURIRON COMPANY, Inc.

Dayton, Ohio

DURIRON
LOOK FOR THE NAME ON EVERY PIECE



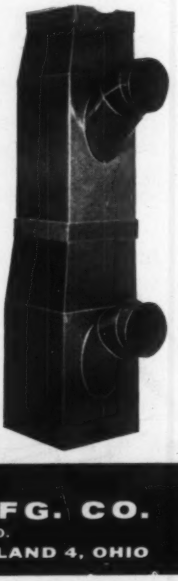
Van-Cor

90 and H Joining Strips

Revolutionary Method of Connecting PVC Sheet Stock—Van-Cor 90 and H joining strips use solvent welding to obtain maximum joint efficiency. They save time and money compared with hot air welding. Skilled welders are unnecessary—your own men can fabricate readily. On major installations using these Van-Cor strips, job costs have been cut over 30%!

Two Shapes—Three Sizes—Use 90 degree joining strips for making corners, H strips in a single plane. They handle sheet in ⅛", 3⁄16" and ¼" gauges. Both shapes available in Van-Cor 1 (normal impact) and Van-Cor 2 (high impact). Standard strip length is 10 feet.

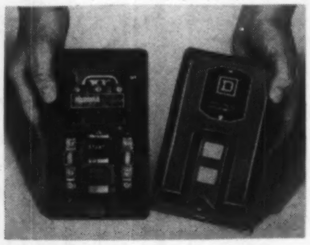
For flanges and stiffeners of fabricated sections, extruded structural angles in 10 foot lengths are available in sizes 1½" x 1½" x 3⁄16" and 2" x 2" x ¼".



Write for Complete Data

INDUSTRIAL DIVISION OF . . .
COLONIAL PLASTICS MFG. CO.
Subsidiary of THE VAN DORN IRON WORKS CO.
2685 EAST 79TH STREET CLEVELAND 4, OHIO

and pressure bellows. It is connected to suction side of refrigeration system by copper tube. Factory preset pressure setting 49 lb, adjustable 30 to 55 lb. Operating current is 120 or 208-240 volts, 60 cycles. Frequency of defrost is 1 to 8 cycles per day with minimum of 3 hr between successive defrost cycles.



Motor Starter . . .
. . .for control of motors to 7½ hp — *Square D Co., Dept. HPAC, 4041 N. Richards St., Milwaukee* 12.

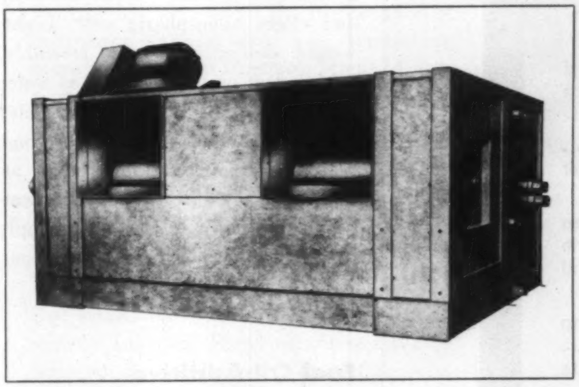
New feature of unit is heavy duty, toggle action operating mechanism designed to give positive snap action opening, closing of contacts. "Trip-free" overload protection provided by melting alloy type relays of unit construction, company says. Self centering pushbuttons give visual indication of overload condition. Rated to 600 volts a-c or 250 volts d-c, starters available in 2-, 3-, or 4-pole construction. In addition to open type version, line of enclosed models offered by manufacturer to meet wide range of application requirements.

Nozzles . . .
. . .with flow rates 2 gpm and less — *Bete Fog Nozzle, Inc., Dept. HPAC, Greenfield, Mass.*

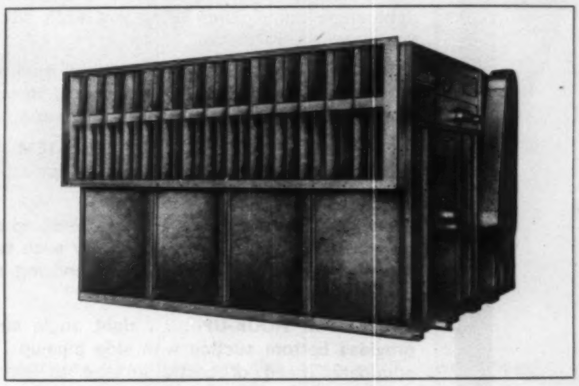
New "W" series made in eight models with 80 deg spray patterns, full or hollow cone optional. Each

These two new Carrier Central Station Air Conditioners can save hours of design time

Today, tomorrow or the day after, someone in your office will be face to face with the time-consuming problem of locating and selecting the right fan-coil unit for an air conditioning system. Now Carrier cuts hours off the job with these two new central station air conditioners. They're so compact they go places where others won't. They make piping layouts a cinch. Connections are all on one side or the other. Truly horizontal or truly vertical air discharge solves location headaches. Centrifugal fans develop up to four inches static pressure to handle air distribution at higher velocities. Larger sizes often make one unit do the work of two. Cooling and heating capacity requirements can be closely matched. Equipment selection is hours quicker from only one catalog by either the Entering Wet Bulb or the Apparatus Dewpoint method. No basic data calculations required. For your copy of the 72-page catalog that provides complete, detailed information, phone the nearest Carrier office. Or write Carrier Corporation, Syracuse, N. Y.



39AC SYSTEM WEATHERMAKERS for conventional central station applications. Building block construction for easy field handling. For use with direct expansion or chilled water cooling systems; steam or hot water heating systems. In eight sizes, from 3000 to 41,000 cfm and air velocities from 300 to 700 fpm.



39W ZONING WEATHERMAKERS for simultaneous independent cooling and heating of up to 14 different zones. For use with direct expansion, chilled water or brine cooling systems; steam or hot water heating systems. In eight sizes, from 3000 to 35,000 cfm and air velocities from 300 to 600 fpm.

Another First from DOVER

The First Packaged Cooling Tower with

SELF-CLEANSING BASIN
and ALL-PURPOSE
Right-Angle UTILITY SUMP

Series CF
Horizontal Induced Draft
2 to 200 tons capacity

Dover adds another first to an already impressive list of achievements in the cooling tower industry.

The Dover self-cleansing basin and all-purpose right angle utility sump bring you such advantages as:

SLOPING BASIN . . . basin collects all mud and debris in one section for easy removal through sump flush-out opening.

MUD RISER PROTECTS PUMPING SYSTEM . . . suction line and pump are protected against air intake and harmful foreign matter.

DRAIN DRY FEATURE . . . right angle sump can be adjusted so that basin drains dry each time system shuts off . . . simplifies servicing and winter shut-down.

EASY FIELD HOOK-UP . . . right angle sump provides bottom suction with side pipe-up . . . eliminates need of costly grillage to elevate tower. Tower rests on its own skids.

DOVER
MANUFACTURING COMPANY
Dept. 100. 3117 Weatherford Avenue
Independence, Missouri

FULL DETAILS . . . are yours for the asking. Just a note will do. We'll send you all the information you want and need on the all new Dover Series CF towers. Write today!

unit has three parts: base, with 1/4 in. male pipe thread; whirl plate; orifice plug which is replaceable. Nozzles constructed of teflon, brass, other free machining materials.

Vacuum Breakers . . .

. . .designed to prevent water from siphoning back into supply line — *A. W. Cash Valve Mfg. Corp., Dept. HPAC, 6621 E. Wabash Ave., Decatur, Ill.*

Of all bronze construction, units available in pipe sizes 3/8 to 2 in.; designed to operate under maximum water pressure of 125 lb, maximum temperature of 150 F. When water from inlet side flows through valve, it lifts free floating poppet assembly and closes atmospheric vent. Lightweight design of poppet assembly, rubber seat prevent leakage as water flows through. When inlet water supply is shut off — or if for some reason inlet pressure falls below atmospheric pressure — poppet assembly drops down, closes inlet supply line, opens atmospheric vent, company says.

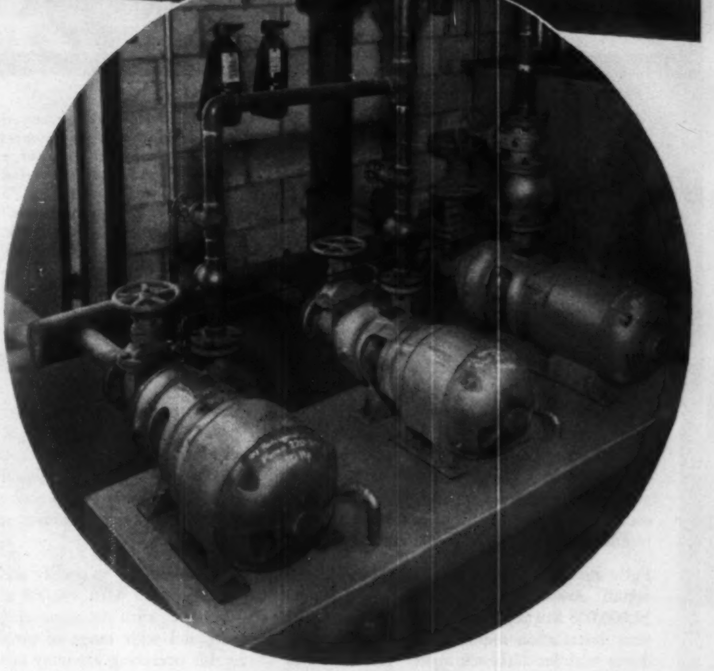
Fuel Oil Additive . . .

. . .for oil burning equipment — *Harco Chemical Co., Dept. HPAC, Cranford, N. J.*

Catalyst added to fuel oil stabilizer makes it chemically possible to prevent accumulations of soot, slag deposits from fire side of oil burning boilers; also prevents sludge buildup in storage tanks and carbonization at preheaters, company says. Combus-

another new supermarket another MOTOR PUMP installation...

PENN FRUIT
penn fruit co



Dependable and economical Ingersoll-Rand Motorpumps help assure operation of the New Supermarket's 100 ton air conditioning system.

Air conditioning architects, engineers and contractors who know the importance of customer satisfaction, are depending more and more on Ingersoll-Rand Motorpumps for care-free, trouble-free service.

Advanced features and rugged construction of I-R Motorpumps for air conditioning have meant an end to costly breakdowns. Low-cost operation and ease of installation make them the natural choice for air conditioning systems.

For additional information contact your nearby Ingersoll-Rand representative or write for data to Ingersoll-Rand Cameron Pump Div., 11 Broadway, New York 4, N. Y.

Features like these set the pace with years-ahead performance:

- Compact, space-saving
- Operate in any position
- Simple installation
- Sizes up to 75 hp

Ingersoll-Rand

9-419

Cameron Pump Division
11 Broadway, New York 4, N. Y.

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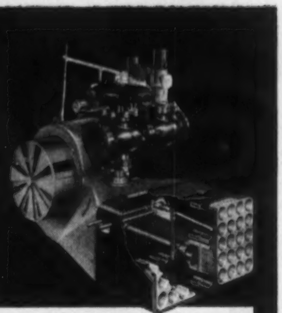
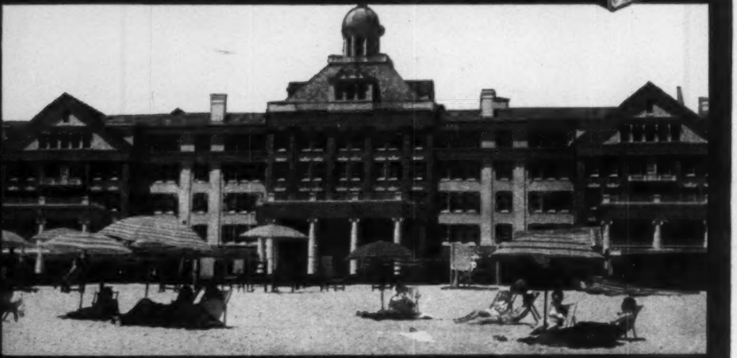
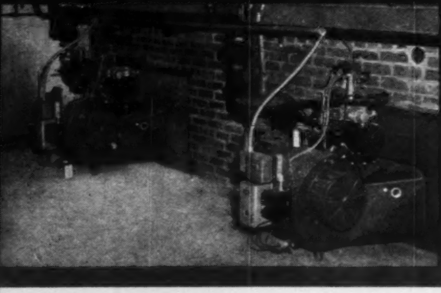
AIR & ELECTRIC TOOLS • GAS & DIESEL ENGINES

Palatial ESSEX-SUSSEX converts to Gas with METTLER "FAN-AIR" Power Burners







Each of these packaged Mettler "Fan-Air" Burners fires one of the two large power boilers supplying all electricity for the 275 rooms and suites, as well as ballroom, dining room, barbershop, and garage, of the luxurious resort hotel. Total input 20,000,000 Btu/hr.

The ability of "Fan-Air" power burners to make old boilers perform like new is again strikingly demonstrated as these two automatic Mettler combustion packages enable Spring Lake, New Jersey's, famous Essex-Sussex Hotel to satisfy better than ever the electric power needs of its hundreds of luxury-seeking guests. The hotel management reports that the two new gas burners greatly simplify steam pressure control on the two big boilers driving the plant's electric generators. In addition, problems of soot and coal dust are completely eliminated.

Fully automatic "Fan-Air" heating units are comparatively simple to specify and install. Available for forced, induced, or natural draft operation with 400,000 to 32,000,000 Btu per hour input, they come *completely* packaged, with the sequencing your installation requires. Quiet, efficient fuel burning and wide range of turndown without flashback make "Fan-Air" your choice for operating economy and controlled performance. *Specify* Mettler "Fan-Air" Burners on your next boiler conversion or new installation.

Write for full details

Bulletin G-200-B describes and fully illustrates "Fan-Air" features, controls, accessories, pilot operation, and major specifications. Covers capacities from 400,000 to 32,000,000 Btu input.

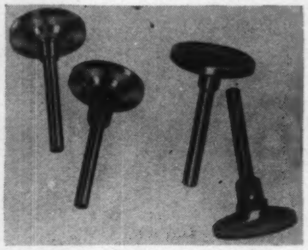
THE METTLER CO., INC.
Division of ECLIPSE FUEL ENGINEERING CO.
4366 Worth Street, Los Angeles 63, California

METTLER
Eclipse

EQUIPMENT DEVELOPMENTS

Continued

tion catalysts said to lower ignition temperature of carbon or soot particles to point where they will burn at normal boiler temperatures. All combustible deposits removed without harm to boiler refractories or heating surfaces, according to manufacturer. Product has flash point of 140 F.



Thermometer . . .

. . . for use in limited space areas — *W. C. Dillon & Co., Inc., Dept. HPAC,* 14620 *Keswick St., Van Nuys, Calif.*

New model "G" has head diameter of 1 11/16 in.; suited for installation on any type of equipment where mounting space is limited, manufacturer says. Unit engineered with direct drive bimetal coil. Constructed entirely of stainless steel—except for aluminum, black crystal protected dial—thermometers said to be moisture sealed, overheat protected, pressureproof, individually calibrated for peak accuracy. Available in 11 ranges.

Tank Cleaner . . .

. . . designed to discharge to 9400 gph through its two revolving jets which have cleaning range of 50 ft each — *Sellers Injector Corp., Dept.*

"I didn't know you made switches and valves like these ..."

Most heating men *do* know that McDonnell makes boiler water feeders, low water cut-offs and hot water relief valves.

A lot of them may *not* know that complete devotion to the "Doing One Thing Well" idea has required the development of many special products. Some of them are shown here.

Just keep this in mind: If the job calls for regulating any kind of a liquid level, or controlling an alarm or motor from a liquid level, the chances are that McDonnell can pick the answer right off the shelf.

For a quick round-up of all McDonnell Products write for a copy of new 24-page Catalog SC-5

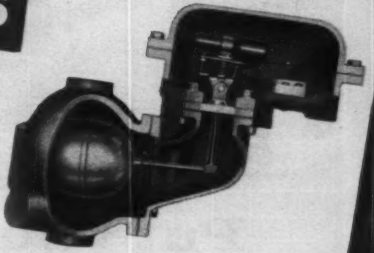
McDONNELL & MILLER, Inc.
3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well

No. 65

Underwriters' listed

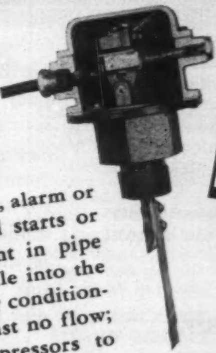
Explosion Proof Electric Controller



A float-operated switch for use under hazardous conditions such as atmospheres containing butane, benzol, lacquer solvent, alcohols, acetone, coal and grain dust, etc. Recent applications include control of gasoline tank levels at Air Force bases. Can be furnished to make or break circuit at high or low level. For internal pressures to 40 lb.

No. E-2

Flow Switch



Serves to start or stop a pump, alarm or meter when flow of a liquid starts or stops. Can be mounted right in pipe line; extends a flexible paddle into the pipe. Is being used on air conditioning systems to guard against no flow; with generators and compressors to assure flow of cooling water; in mixing and blending various liquids; and for many other jobs. For working pressures up to 150 lbs.

Your Jobber Stocks Them

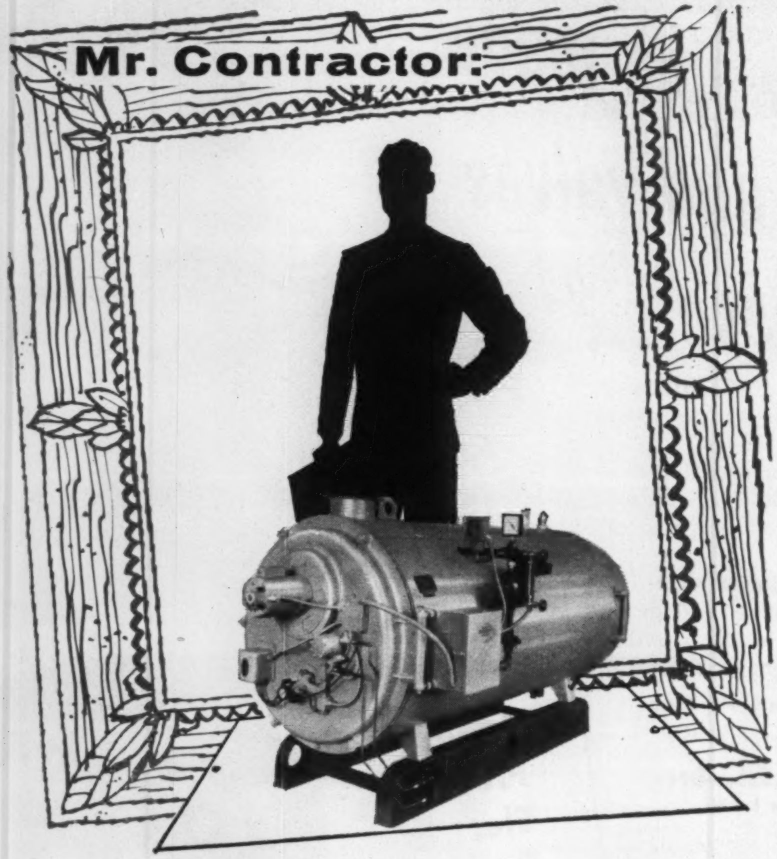
No. 18

Float Valve

Simplest answer yet for hundreds of liquid level control jobs. It is being used on humidifiers, evaporative coolers, coffee urns, fish aquaria, bird baths, etc. Has neoprene valve disc; all other parts are brass or copper. Available also with float arm at right angles for overhead inlet, and with float chamber and cover. Seats tightly against supply pressures up to 100 lbs.

McDONNELL

Boiler Water Level Controls



Put yourself in the **Progress** picture

You'll profit more with the Cleaver-Brooks Progress boiler because it simplifies your planning, purchase and installation. No scatter-buying or boiler-building on the job. You can save up to 2 days' time by installing Progress, a complete, integrated, factory-tested package — ready for you to hook up to service lines. A Cleaver-Brooks representative starts the boiler, trains the attendant. Outstanding Progress features: Four-pass, forced-draft design; electronic controls; soft-flame start; clean-burning, quiet operation; guaranteed 80% efficiency — assure you customer satisfaction.

The Progress is available in 7 sizes to 2,010,000 Btu. Oil, gas, and combination oil/gas-fired models fit all types of heating needs. See your nearest *Qualified Cooperative Wholesaler* or write today.

Progress
TECHNICAL GUIDE

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Built exclusively for commercial heating.

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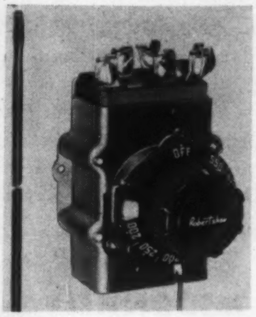
City .... Zone .... State ....

EQUIPMENT DEVELOPMENTS

Continued

HPAC, 1606B Hamilton St., Philadelphia 30.

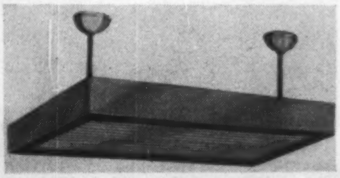
"Jumbo" cleaner uses available pumps, lines to drive its jets in spherical pattern, scrubbing entire surface of largest tanks with cold or hot water to 176 F, company says. Product requires 114 psi for most efficient, economical operation; simple, rugged construction, waterproof parts assure reliable service, according to manufacturer.



Electric Thermostat . . .

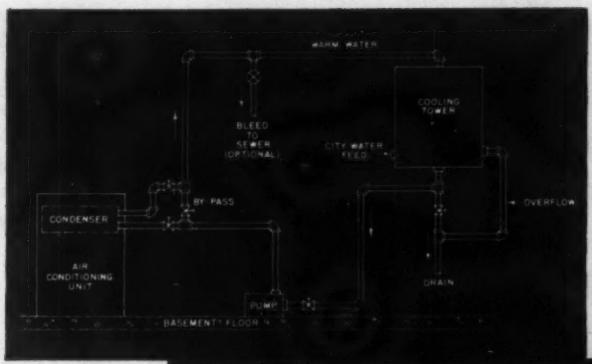
. . . designed for variety of industrial, commercial applications in temperature ranges to 700 F — *Robertshaw Thermostat Div., Robertshaw-Fulton Controls Co., Dept. HPAC, Youngwood, Pa.*

New thermostat has approved rating of 20 amp, 250 volts a-c, company says. It controls three separate heating phases, one of which is on continuously when dial is moved from off position. Two other phases controlled thermostatically; automatically cycle with changes in temperature. Available in nine temperature ranges with variety of suitable dial markings.



Electric Ceiling Heater . . .

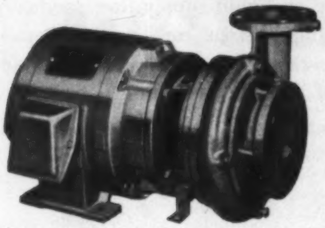
. . . for use in large, open, exposed areas — *Ampere Industries, Dept. HPAC, 60 Boston St., Newark 3, N.J.*



QUIETER PUMPS

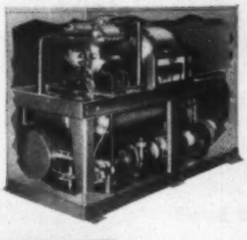
FOR COOLING TOWER APPLICATIONS

B&G 1522 CENTRIFUGAL PUMPS



B&G SERIES 1531-B CENTRIFUGAL PUMPS

Featuring vertical split case design... self-lubricating, leak-proof "Remite" mechanical seal ... latest NEMA motors. Super-finished shaft oversized for minimum deflection. Impeller is of sound hydraulic design, with balancing ring and relief holes to reduce thrust. Capacities to 1200 GPM, heads to 420 ft. Many sizes carried in factory stock.



B&G PACKAGE LIQUID COOLER

A complete cooling unit for homes, apartments, commercial and industrial buildings. Low pressure drop through evaporator—non-recycling pump down—integrated electrical control system—complete wiring—are a few of many outstanding features. Send for Bulletin HB-755.

Get rid of pump noise troubles in your cooling installations ...next time install a B&G 1522!

This pump is *really quiet*...because *both pump and motor* are equipped with long bronze sleeve bearings...and because of the noise-dampening flexible spring-type coupler.

The B&G 1522 offers an impressive number of other features for dependable, low-cost operation. The "Remite" Mechanical Seal, for example, ends leakage troubles. It's self-lubricating—harder than glass—wear-proof. The impeller is dynamically balanced for smooth, vibrationless operation... the entire bearing bracket assembly, including shaft and sleeve bearing, is interchangeable. Servicing is simple—the 1522 separates into three parts.

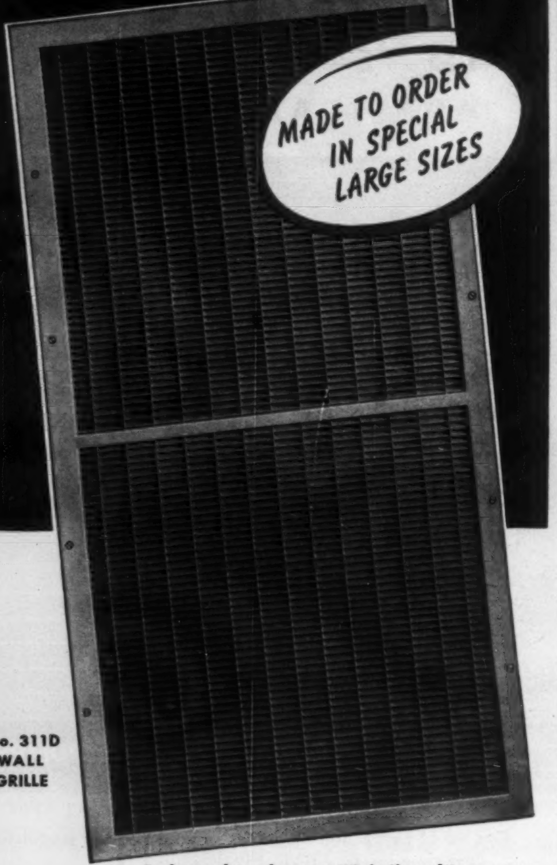
All these plus values cost no more—the B&G 1522 Pump is *competitively priced!* It is available as an all-iron, bronze-fitted, all-bronze or a stainless steel unit, with capacities to 150 GPM, heads to 115 ft. Available in common sizes from factory stock. Send for Catalog.

Send for your free copy of the B&G Six Step Manual for Designing Cooling Tower Systems.

BELL & GOSSETT
COMPANY
Dept. RFE-5, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, W. Toronto

For Commercial Installations

"Fabrikated"® WALL GRILLES



No. 311D WALL GRILLE

Independent famous "Fabrikated" construction makes these grilles especially adaptable to large sizes for schools, hospitals, hotels, and other commercial buildings.

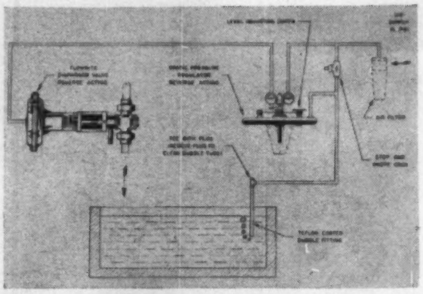
CHECK THESE FEATURES!

- ✓ Vertical or horizontal bars strengthened by interlocking cross bars; no vibration.
- ✓ Tamper-proof. Changes in air distribution cannot be made by unauthorized persons.
- ✓ Mesh (3/8 x 1 11/16) filters 72% of free area yet darkens the duct and reduces highlights from back of the grille.
- ✓ 14 gauge steel solid bars ½" deep—strong enough to be "kick-proof"—(a must for schools).
- ✓ All bars made from round edge stock. No sharp edges. (A must for schools).
- ✓ The only grille for taking abuse in school gyms and hospital psychopathic wards.

These grilles are unusually rigid-strong and exceedingly resistant to impact—the best that money can buy. We make them in any size. Send your specifications. We are prepared to give immediate service because we always stock grille parts for any size.

THE INDEPENDENT
REGISTER CO.
3747 E. 93rd STREET · CLEVELAND, OHIO

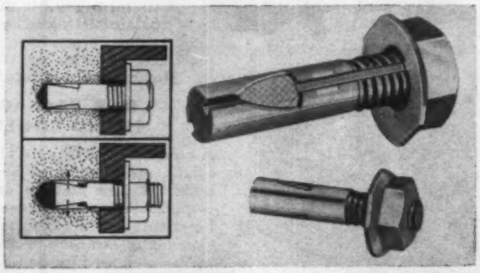
Feature of model "C-257" is element that produces volumes of long-wave infrared rays with radiant efficiency of 91 percent, company says. Radiant heat said to be distributed gently, comfortably over broad areas. Each panel equipped with 22 in. suspension rods that secure to ceiling.



Air Operated Control System . . .

. . . designed to control liquid levels within ¼ in. — *Powers Regulator Co., Dept. HPAC,* 3434 *Oakton St., Skokie, Ill.*

New system works as follows: end of air line — or bubbler — placed below surface of liquid. Air at 15 psi or less passes through line, causing slight bubbling action in liquid. Air pressure in line to bubbler also transmitted to static pressure regulator. Should liquid drop slightly from its proper level, pressure of liquid upon tip of bubbler will be reduced. Thus, less pressure is required to force air out of pipe, company says. Change in pressure transmitted back to static pressure regulator. Regulator, in turn, will re-position diaphragm control valve on liquid supply line, gradually increasing flow of liquid into container to regain proper level. Once installed, level of liquid can be adjusted over range of 1½ in., according to manufacturer.



Expansion Bolt . . .

. . . designed to simplify fastening and anchoring equipment, machinery, structural members in construction materials — *Kirel, Inc., Dept. HPAC,* 326 *E. 28th St., New York* 16.

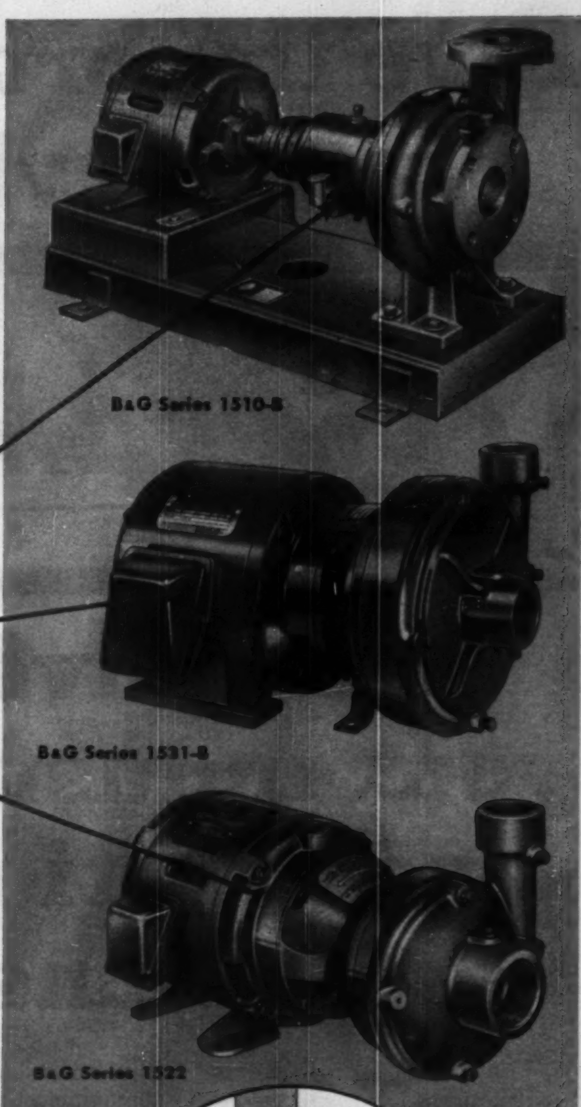
"Wej-It" expands as it is tightened, making dependable anchor without separate sleeves, butterfly ends,

WHEN YOU NEED A *GOOD* PUMP IN A *BIG* HURRY...

SERIES 1522, 1531 AND 1510
CENTRIFUGAL PUMPS
AVAILABLE FROM STOCK

SELECTION CHART AND LIST PRICES
No. CSP-257

featuring



ORDER A

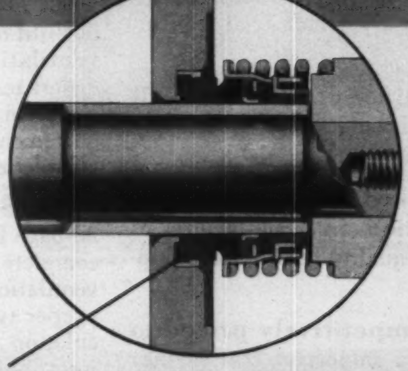
B&G STOCK PUMP!

B&G maintains a factory stock of the most commonly used sizes of centrifugal pumps for immediate delivery. Base mounted and integral-motor pumps as listed in B&G Stock Pump Catalog are available in capacities to 325 GPM, heads to 140 ft.

Why B&G Centrifugal Pumps give years of trouble-free service is evident from their design features. Vertical split case construction permits removal of the bearing bracket without disconnecting pipe lines or motor leads. Special alloy steel shafts are super-finished and over-sized to keep deflection at a minimum.

Leak-proof operation is assured by the "Remite" Mechanical Seal—an exclusive B&G development. "Remite" is so hard it will cut glass—eliminates packing rings and gland adjustment. Seal is self-lubricating.

Send the coupon for catalog



LEAK-PROOF "REMITE" MECHANICAL SEAL

BELL & GOSSETT
COMPANY
Dept. FE-5, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong, Ltd.,
1400 O'Connor Drive, Toronto 16, Ontario

BELL & GOSSETT CO., Dept. FE-5, Morton Grove, Ill.
Please send a copy of the B&G Stock Pump Catalog CSP-257A.

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Five important reasons why

Power Line

best solves your industrial ventilation problems:

1. Complete line: Broadest product line of air-moving equipment for every industrial requirement.

2. Certified performance: All Power Line Fans are rated by PFMA and by NAFM.

3. Backed by 33 years of specialization in manufacture of highest quality ventilation equipment.

4. Competitively priced to give you important cost savings in initial investment and in maintenance. You get the precisely right product to fit your requirements. You don't over-buy with equipment too large or under-buy with equipment too small.

5. Sold only through qualified ventilation specialists. You get expert technical advice and service from the survey of your requirements right through to the completion of your installation.

YOURS ON REQUEST: Big 20-page Power Line Catalog gives complete facts about industrial ventilation, including selection of proper type and size of fan, calculation of duct resistance, and installation procedures, plus features, dimensions, specifications and performance data. Without obligation write for your free copy of Catalog No. 97

POWER LINE FAN COMPANY, INC.

Subsidiary of Chelsea Products, Incorporated 97-A South Avenue, Plainfield, New Jersey

EQUIPMENT DEVELOPMENTS

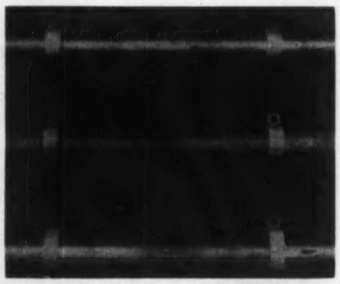
Continued

or other mating parts, manufacturer says. Available in ferrous, nonferrous metals in sizes carrying working loads 200 to 1000 lb. Standard diameters 1/4 to 3/4 in., lengths 1 3/8 to 3 in.

Hose Clamp . . .

. . . with selftightening feature — *Corbin Hose Clamp Div., American Hardware Corp., Dept. HPAC, New Britain, Conn.*

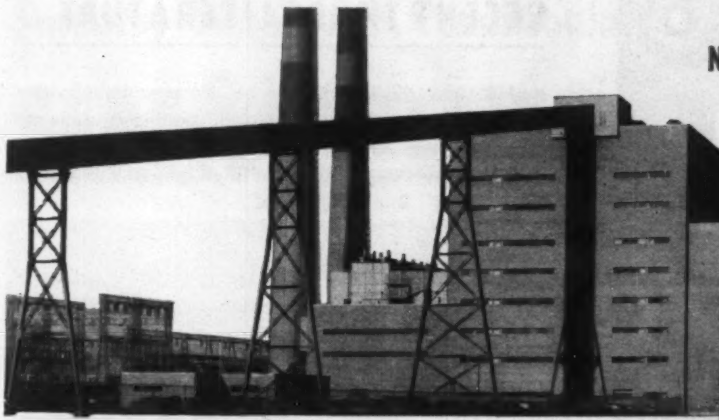
Unit is single ring of steel; expands, contracts with variable temperature conditions. Clamp maintains perfect seal without damage to hose, company says. No adjustments needed after assembly. Installation can be adapted to particular requirements of job. Units finished with zinc plate fortified by dichromate treatment.



Molded Nylon Hangers . . .

. . . designed to support tubing, piping — *Burndy Corp., Dept. HPAC, Norwalk, Conn.*

"Nyloclips" weigh 8/10 oz each, will support more than 250 lb, manufacturer says. Tube, pipe diameters accommodated range 1/8 to 2 in. Products said to resist effects of temperatures 65 to 250 F for sustained periods. Hangers may be snapped onto pipe. ‡



New England Electric Company's
SALEM HARBOR STATION

Architects, Engineers **General Contractors**	United Engineers & Constructors Philadelphia, Pa.
Sheet Metal Contractors	Delbrook Ventilating Company Cambridge, Massachusetts

Partial view in the large fan room shows some of the Continental Automatics which clear the air for this modern power plant. Recognizable on the filters are the automatic sprinkler systems and the overflow drains.

Maintenance is at a Minimum when CONTINENTAL *clears the air*

To assure that their maintenance and servicing requirements would be held to an absolute minimum, New England Electric Company chose Continental Automatic Self-Cleaning Air Filters for their $38 million Salem Harbor Station.

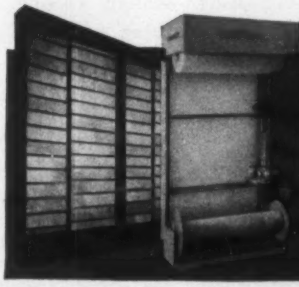
There are two main systems on the job, which provide 483,000 CFM for the general ventilation of the five-story building. This air passes eventually to the generators and the boiler plant, and provides combustion air for the boilers.

Since the system was first started up in October, 1952, the huge filters have never been stopped, have had no need whatever for any maintenance other than to replace oil filter cartridges every nine months and replenish the filter oil annually.

Long-run economy and freedom from maintenance are engineered into all Continental Air Filters. They can save you important servicing and operating costs. Let us talk over your air filtration needs. Clear the air with Continental.

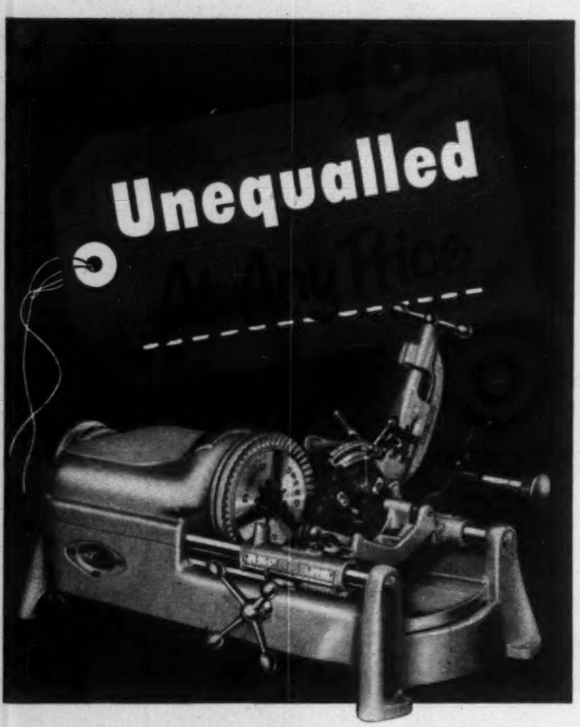
CONTACT YOUR LOCAL CONTINENTAL REPRESENTATIVE, OR

This partial view of Continental Automatics at Salem Harbor shows the couplings which interconnect the oil reservoirs. A continuous pump recirculates the oil through an oil filtration unit at the rate of one complete change every hour.



P.O. BOX 1647 LOUISVILLE 1, KY.

CONTINENTAL AIR FILTERS Inc.



RIDGID
No. 535
Pipe & Bolt Threading Machine
Complete with 1 Universal Die Head
and 2 Sets of Dies, ½" to 2"...

(Slightly higher in Canada)

Built like a machine tool, designed to thread, cut and ream with speed and ease no other machine offers you. Compare its slip-proof Speed Chuck, front chucking, instant size-change right in carriage, and many other RIDGID features. It pays you to see and try this most-for-your-money 535 at your Supply House before you decide.

RECENT TRADE LITERATURE...

▶ *AIR CONDITIONING* — New 34 page bulletin 80-E contains information on air conditioning equipment. Data on particular installations and illustrations provided. Features of equipment highlighted. *Frick Co., Dept. HPAC, Waynesboro, Pa.*

▶ *AIR CONDITIONING UNITS* — New 28 page catalog 55C7C covers air conditioning units sizes 1650 to 34,000 cfm. Tables show coil performance ranging 400 to 600 fpm face velocity at six different conditions for chilled water and direct expansion and three different conditions for hot water and steam conditions. Static pressure data on coils, filters along with fan performance provided. *Recold Corp., Dept. HPAC,* 7250 *E. Slauson Ave., Los Angeles* 22.

▶ *AIR CONDITIONING UNITS* — Catalog No. HC-C5 available giving information on four series of standard, recessed floor and overhead remote type air conditioning units. Available in 4 sizes, with standard and low speed motors. Exploded views and individual parts, cooling and heating capacity ratings, performance graphs included. *Fedders-Quigan Corp., Heating Div., Dept. HPAC, Lalor and Hancock Sts., Trenton* 7, *N. J.*

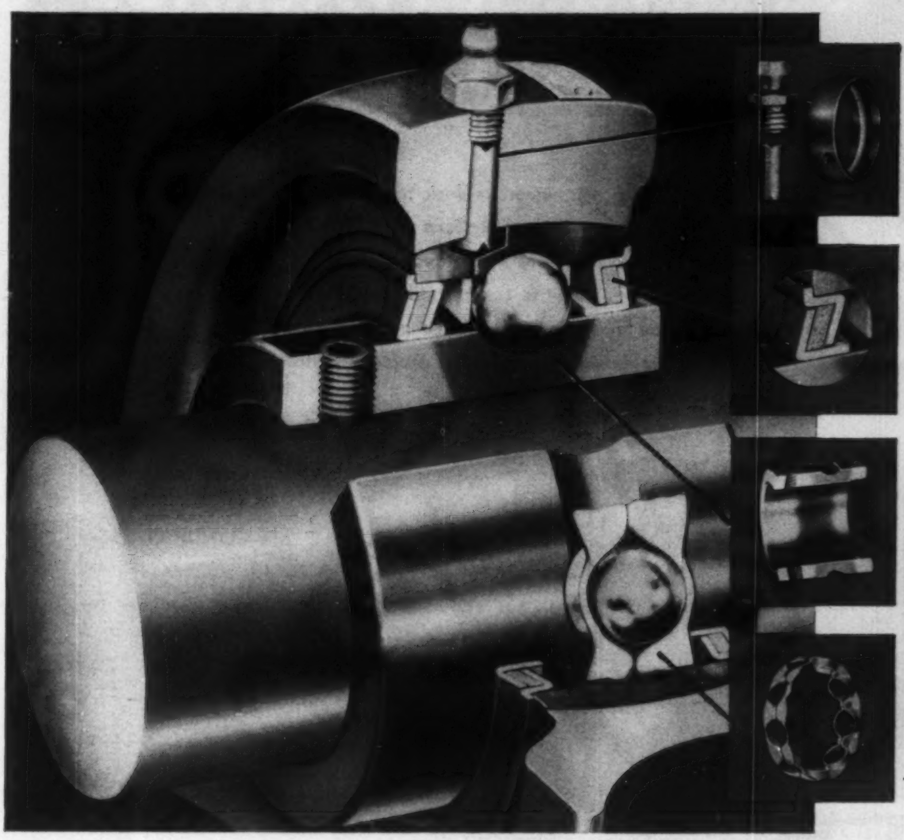
▶ *AIR ENGINEERING* — Eight page bulletin 135 discusses air engineering for process industries. Subject matter is collection of brief descriptions with use, capacity information on apparatus manufactured by company. General field is process, such as chemical, food, metallurgical, plastics applications in such functions as heat removal by air method in process cooling, heat treating, vacuum distillation, refrigeration, air liquefaction; heat and moisture control as in processing, packaging and storage, low temperature conversion, drying. *Niagara Blower Co., Dept. HPAC,* 405 *Lexington Ave., New York* 17.

▶ *AIR HANDLING UNITS* — Descriptions, illustrations on all purpose air conditioners for commercial, institutional, industrial, process applications provided in new 56 page catalog. Units may be selected for one or all phases of air conditioning—heating, cooling, ventilating, humidifying, dehumidifying, filtering. Data on performance and operation, construction, basic application selection, engineering specifications provided. More than 50 illustrations included. *Trane Co., Dept. HPAC, La Crosse, Wis.*

▶ *ALUMINUM SHEETS* — Chart offered giving government aluminum specifications, information on

Smooth, Silent Air Conditioning Performance Depends on

SEALMASTER BALL BEARING UNITS



EXCLUSIVE COMBINATION OF FEATURES . . .

LOCKING PIN & PERIMETER DIMPLE

. . . permits selective fit between outer race of bearing and housing — an important feature that assures quiet bearing operation for air conditioning service.

LABYRINTH SEAL

. . . keeps dust and dirt out and lubricant sealed in, assuring long bearing life.

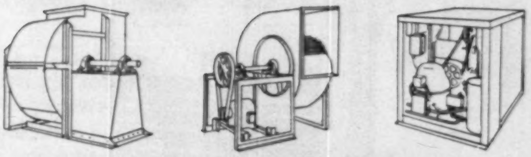
ZONE HARDENING

. . . assures positive race to shaft holding power. Reduces corrosion.

LAND RIDDEN BALL RETAINER

. . . minimizes ball wear, traps grease and prevents "churning."

An air conditioner — like any piece of equipment — becomes obsolete the day your competitor's product out-performs your own. It is for this reason that air conditioning engineers are continually involved in research to find ways to improve their product. It's the reason, too, that you find SEALMASTER Ball Bearing Units specified by many of the leading air conditioning manufacturers. SEALMASTER Ball Bearing Units, with their exclusive combination of patented engineering features, provide you with a decided performance advantage. It's the ball bearing unit line that's often copied but never equalled for performance.



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PILLOW BLOCKS

CARTRIDGE UNITS

FLANGE CARTRIDGE UNITS

RUBBER MOUNTED UNITS

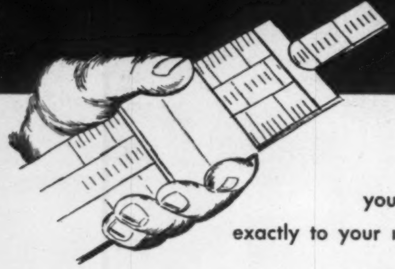
FLANGE UNITS

Write for catalog 454

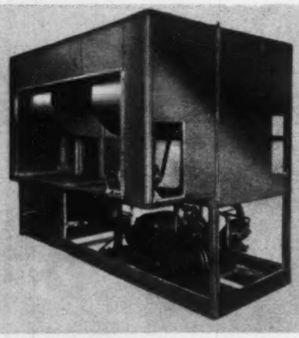
SEALMASTER BEARINGS A DIVISION OF STEPHENS-ADAMSON MFG. CO. 47 RIDGEWAY AVENUE, AURORA, ILL.

Unusual air-conditioning needs? . . .

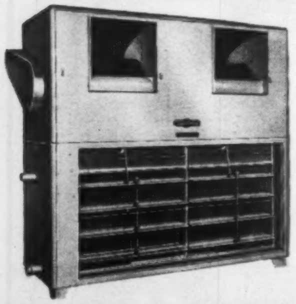
YOU CAN "DESIGN" YOUR OWN ©*Satisfabricated* PACKAGE . . . AT GOVERNAIR!



Yes, working with numerous basic models, Governair will incorporate your specifications and modifications to SATISFABRICATE the package exactly to your needs. You can be sure of its quality, too . . . for every Governair unit is constructed by expert craftsmen. This is your assurance of dependable performance and exact fit. Why not consult us on your next air conditioning project . . . from 3 to 100 ton units.



SELF-CONTAINED MULTI-ZONE AIR CONDITIONERS—with evaporative condenser. Zoned conditioner section — hot and cold deck, with mixing dampers for each zone. Sizes 7½ to 80 ton — single or dual refrigeration circuit. Ready for simple connection to duct system.



FAN AND COIL CABINETS — cooling, heating, humidifying, dehumidifying, ventilating, 1 to 100 ton, 500 to 30,000 cfm, vertical or horizontal types. Governair multi-zone fan and coil units are available in sizes ranging from 5 to 80 ton capacities, suitable for individual zoning.

Also: Blast Coils, Cooling Towers, Packaged Water Chillers, Low Temperature Coolers.

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bending and forming of aluminum sheet and plate. Chemical analysis requirements, specified forms (sheet, bar, etc.) and nearest corresponding ASTM, SAE, AMS specification numbers are listed. *Peter Frasse & Co., Inc., Dept. HPAC,* 17 *Grand St., New York* 13.

▶ *ALUMINUM INSULATIONS* — Results of two-year study at NBS on value of aluminum clad insulations available in book form. Study covers insulating values of reflective and fibrous combinations, value of application of single and combination insulations, effects of adjoining air spaces on values of fibrous insulations of blanket, batt and board form. *Aluminum Co. of America, Room* 728, *Dept. HPAC, Alcoa Bldg., Pittsburgh* 19.

▶ *AMMONIA VALVES* — Catalog No. 202 covers ammonia valves, accessories for refrigeration and industrial application. New products include shutoff valves; purge, oil drain, and gage mounting valves of forged steel; forged steel unions, flanges; ductile iron shutoff valves; packaged dual relief valve assemblies. *Henry Valve Co., Dept. HPAC,* 3215 *North Ave., Melrose Park, Ill.*

▶ *AUTOMATIC VALVE* — New 4 page bulletin now available gives data on pressure reducing and regulating valves, back pressure valves, diaphragm operated control valves. Diagrams and specifications included. *A. W. Cash Valve Mfg. Corp., Dept. HPAC, Decatur, Ill.*

▶ *CENTRIFUGAL COMPRESSORS* — Catalog for 28 standard models rated 90 to 1100 tons available. Rating tables, descriptions of compressor-motor combinations, cooler and condenser sizes with water passes, kilowatt input, graphs for reading water pressure drop across cooler and condenser, machine weights all provided. Dimensions, diagrams of

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for every heating and air conditioning application

To contractors, heating and air conditioning engineers, and equipment manufacturers, the USG trade mark is synonymous with ACCURACY, RUGGEDNESS, DEPENDABILITY.

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Division of American Machine and Metals, Inc.
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Cut Steel or Cast Iron Pipe up to 12"
EASIER and FASTER

WITH THE *NEW*
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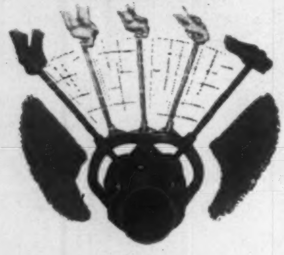

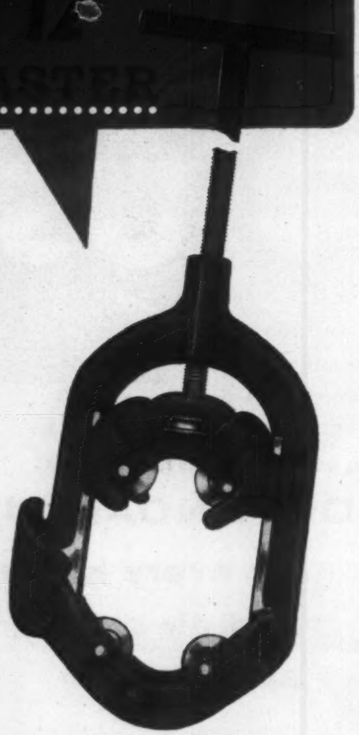

HINGED 4-WHEEL
PIPE CUTTER

- Closed Frame Construction assures complete rigidity with less weight.
- 4-Wheel design needs minimum swing of handle.
- 4-Point pipe guide aligns cutter for perfect tracking of wheels and a right angle cut.
- Quickly interchangeable wheels for steel or cast iron.
- Needs only 3" space to pass under 12" pipe.

For ditch work or similar close-quarter operations these new Reed Cutters are practically indispensable and fully justify replacing whatever cutting equipment you are now using.

You can, for example, cut 8" steel pipe in less than five minutes, and cast iron pipe even faster.

Available in five sizes for steel or cast iron pipe from 1" to 12".

FOR FAST TURNING IN TIGHT SPOTS—
USE THE IMPROVED REED CHAIN WRENCH

Handles range from 10" to 60" in length.
•
You can tighten up or "back off" without taking wrench from pipe.

These improved chain wrenches will do anything an ordinary pipe wrench will do . . . and do it easier, better and faster. Ideal for ditches or tight corners.

Grip securely with no play, yet they have a ratchet-like action.

REED
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have your need. See your jobber or write for literature.
REED MANUFACTURING COMPANY
ERIE • PENNSYLVANIA

RECENT TRADE LITERATURE

Continued

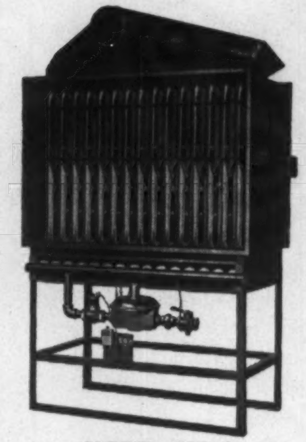
nozzle arrangements for heat exchangers, current requirements of electric motor also included. *Carrier Corp., Dept. HPAC,* 300 *S. Geddes St., Syracuse* 1.

▶ *CONTROL VALVES* — New 4 page specification S810-16 details company's "Series 800" three-way diaphragm control valves. Single and double-seated designs for mixing or diverting service covered. Sizes, materials, pressure ratings, cross-sectional drawings of body types given. *Minneapolis-Honeywell Regulator Co., Valve Div., Dept. HPAC, Fort Washington, Penna.*

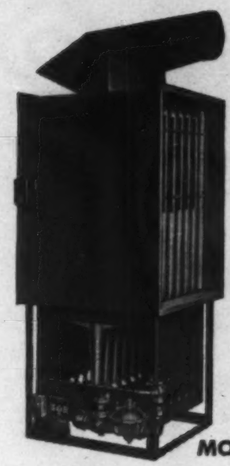
▶ *CORK FOR NOISE, VIBRATION CONTROL* — Vibration, shock, noise controlling material discussed in new bulletin VC-501. "Vibracork" designed for massive, difficult to isolate machinery, because it provides effective isolation of vibration, shock, noise by virtue of high resiliency, structural strength. Product available in two densities, three thicknesses. Standard sheet size is 12 × 36 in. Illustrations provided. *Korfund Co., Inc., Dept. HPAC,* 48-15 32*nd Pl., Long Island City* 1, *N. Y.*

▶ *DIAPHRAGM SEALS* — Bulletin 250 describes diaphragm seals designed to protect pressure instruments against corrosion, clogging. Nine illustrations included. Among features cited: honed metal to metal sealing surfaces; no internal threads or blind taps; overrange protection to 2500 psig; only single wrench required for assembly or disassembly. *Brooks Rotameter Co., Dept. HPAC, Box* 432, *Lansdale, Pa.*

▶ *DOOR GRILLES* — New 8 page bulletin F-8308 describes door grilles designed to be visionproof from any angle. Four illustrations show typical uses of units. Specifications, sizing chart provided. *Barber-Colman Co., Dept. HPAC, Rockford, Ill.*



MODEL SED-E

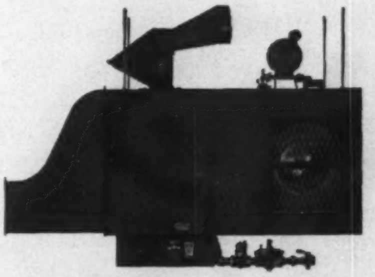


MODEL SED-S

MODEL SED-VF

MODEL SED-E — Non-corrosive type 321 stainless steel heat exchanger. Permits installation downstream of cooling equipment, for continuous blower operation. Air throughput in either direction. 80,000 to 600,000 Btu input.

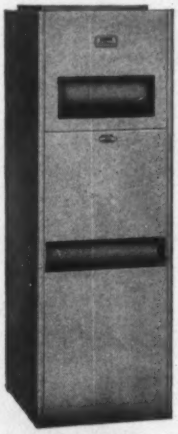
MODEL SED-S — Same as SED-E except controls are at the side, instead of at the end where accessibility requires. Either SED-E or SED-S is available in sizes from 80,000 to 600,000 Btu input in increments of 40,000 Btu.



MODEL SEU

MODEL SED-VF — Tested and approved as a duct furnace; type 321 stainless steel. Re-circulated or fresh air enters through bottom, sides, or back. Built-in air bypass, vent in front. Sizes from 70,000 to 280,000 Btu input.

MODEL SEU — Suspended unit heater. Recirculates room air. Diffuser outlet with adjustable vertical and horizontal vanes. Double inlet forward curve blower. Continuous duty, variable pitch drives, raised port burners. 80,000 to 480,000 Btu input.



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outstanding for commercial, industrial, schools, churches, theaters, large residential

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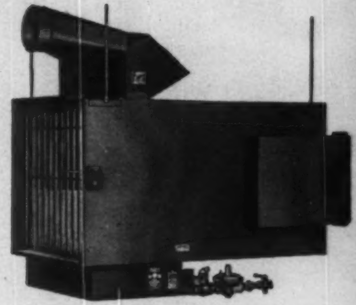

MODEL SES

MODEL SEC — Forced air furnace. Stainless steel heat exchanger sections seam and arc welded. One piece cast iron burners with drilled ports. Oversize double inlet blower, glass or washable filters. 6 sizes — 70,000 to 245,000 Btu input. For zero clearance.

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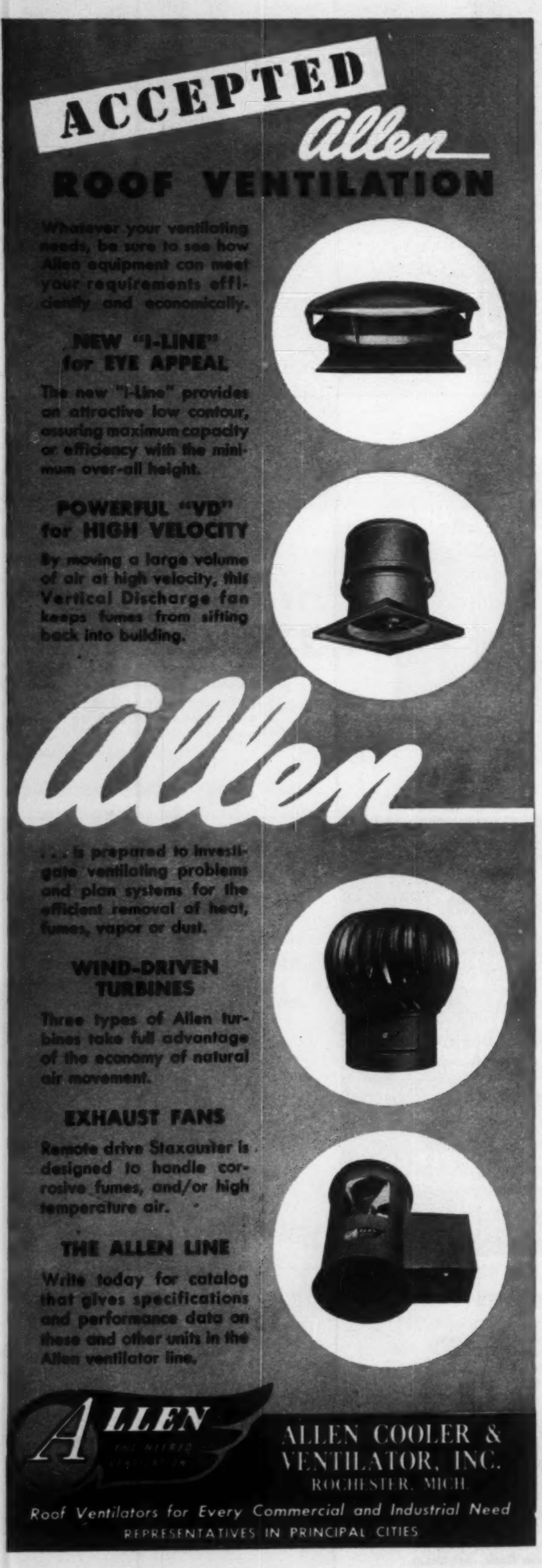
Boyd Engineering Co., El Paso, Texas.
Reube O. Emery, Nashville, Tennessee.
F & D Distributors, Salt Lake City, Utah.
Leudecke Engineering Co., Austin, Texas.
McCombs Supply Co., Denver, Colorado.
O'Connor-Oklahoma Co., Oklahoma City, Tulsa, Oklahoma & Wichita, Kas.
Smith Steam Specialty Co., Kansas City, Mo.
Tay-Holbrook, Inc., San Francisco, California.
Dealers Supply Company, Atlanta, Georgia.
J. C. Lewis Company, Little Rock, Arkansas.
Nunn Electric Co., Lubbock, Texas.
Noland & Co., Newport News, Va.
Temp-Control Corp., Portland, Oregon

MODEL SES—Forced air, suspended furnace for installation in suspended duct system. Inlet and outlet designed for sheet metal duct connection. Double inlet forward curved blower. Continuous duty variable pitch drives, raised port burners.



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Whatever your ventilating needs, be sure to see how Allen equipment can meet your requirements efficiently and economically.

NEW "I-LINE" for EYE APPEAL

The new "I-Line" provides an attractive low contour, assuring maximum capacity or efficiency with the minimum over-all height.

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By moving a large volume of air at high velocity, this Vertical Discharge fan keeps fumes from sifting back into building.

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. . . is prepared to investigate ventilating problems and plan systems for the efficient removal of heat, fumes, vapor or dust.

WIND-DRIVEN TURBINES

Three types of Allen turbines take full advantage of the economy of natural air movement.

EXHAUST FANS

Remote drive Staxouster is designed to handle corrosive fumes, and/or high temperature air.

THE ALLEN LINE

Write today for catalog that gives specifications and performance data on these and other units in the Allen ventilator line.

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Roof Ventilators for Every Commercial and Industrial Need
REPRESENTATIVES IN PRINCIPAL CITIES

RECENT TRADE LITERATURE *Continued*

▶ *DUST COLLECTOR* — Six page bulletin A-957 describes wet and dry type dust collectors, auxiliary equipment including cyclones, centrifugal and dynamic washers, dust and fiber filters, discharge gates, trickle valves. Two new auxiliary units included in bulletin are "Type C" two-door discharge gate for dry flowable materials; "Type FA" trickle valve which uses gravity for automatic operation with no auxiliary power required. *Ducon Co., Dept. HPAC,* 147 *E. Second St., Mineola, Long Island, N. Y.*

▶ *ELECTRIC UNIT VENTILATOR* — Descriptive bulletins, sample architectural specifications detail all-electric cooling, heating, ventilation unit. Recommended by company for installation in schools, restaurants, offices, stores, churches, auditoriums, bowling alleys. Tables, diagrams included. *Edwin L. Wiegand Co., Dept. HPAC,* 7610 *Thomas Blvd., Pittsburgh* 8.

▶ *FANS, BLOWERS* — Recently released catalog No. 215 covers general construction features, ratings, motor construction, finish, extra features, dimensions and recommended specifications of manufacturer's line of nonoverloading "Class 1" direct drive blowers. *Peerless Electric Co., Dept. HPAC, Warren, Ohio.*

▶ *FASTENERS, DRIVING TOOLS* — New 12 page catalog 8-416 describes fasteners, driving tools for commercial, industrial applications. Features, specifications, uses of fasteners highlighted. Driving cycle for each fastener type illustrated with line drawing. Manual, pneumatic, hydraulic tools for driving commercial fasteners discussed briefly. Illustrations included. *Huck Mfg. Co., Dept. HPAC,* 2480 *Bellevue Ave., Detroit* 7.

▶ *FLOW ALARMS* — Fluid flow rate alarms for signaling, simple control functions described in new bulletin 165. Both magnetic, electronic types available for use with rotameters to meet flow requirements. Each features safe circuit design, sufficient accuracy to detect as little as millimeter of metering float movement, company says. Illustrations, specifications included. *Brooks Rotameter Co., Dept. HPAC, Lansdale, Pa.*

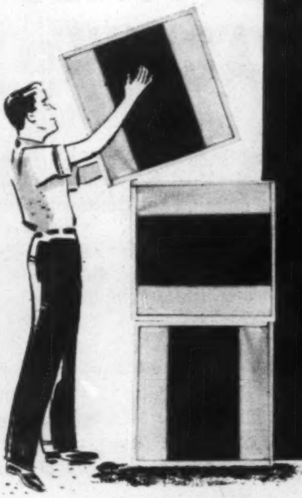
▶ *FLOW METERS* — New 22 page bulletin gives basic information, theory on selection, sizing, installation of various types of primary devices. Introductory section outlines theory of head type flow rate meters. Basic primary devices, their uses, characteristics are described. Installation practices for gases, liquids, steam explained, illustrated. *Bristol Co., Dept. HPAC, Waterbury* 20, *Conn.*

(Continued on page 266)

pioneer producer shows the way to lower cost silencing!

THESE 3 PRODUCTION SIZES SAVE 20%!

Full Size	Half Size	Quarter Size
24" x 24" x 30"	12" x 24" x 30"	12" x 12" x 30"



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Trade Mark

Quiet-DUCT Silencers

- STOCK SHIPMENT
- GUARANTEED SILENCING
- LOWER HANDLING COSTS

MOD-U-Size Quiet-DUCT Silencers provide low cost, guaranteed silencing — now made possible by production-line volume!

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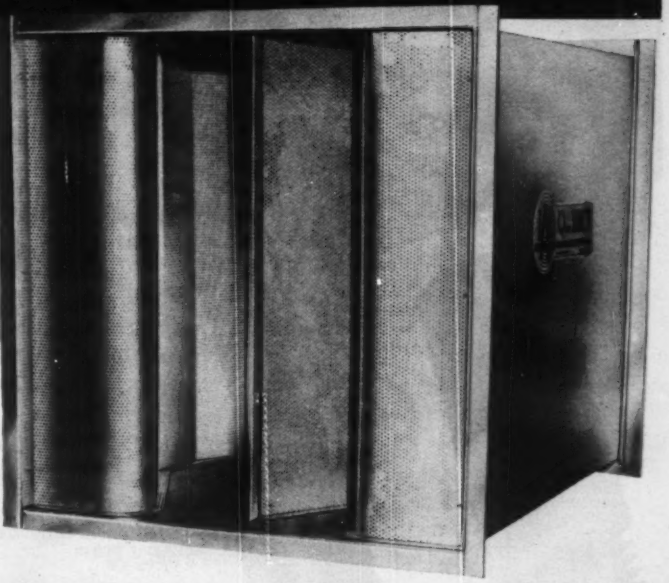
MOD-U-Size Quiet-DUCT Silencers are certified for air flow and pressure drop — as well as acoustic performance — by tests from recognized, independent laboratories!



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Your Standard of Silence

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"Specialists in Noise and Pulsation Control"

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Industrial Acoustics Co., Inc.
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New York 54, N. Y.

☐ Send details on "Mod-U-Size" Quiet-DUCT Silencers
☐ Have representative call.

Name______________________________ Title__________
Company______________________________________
Address______________________________________
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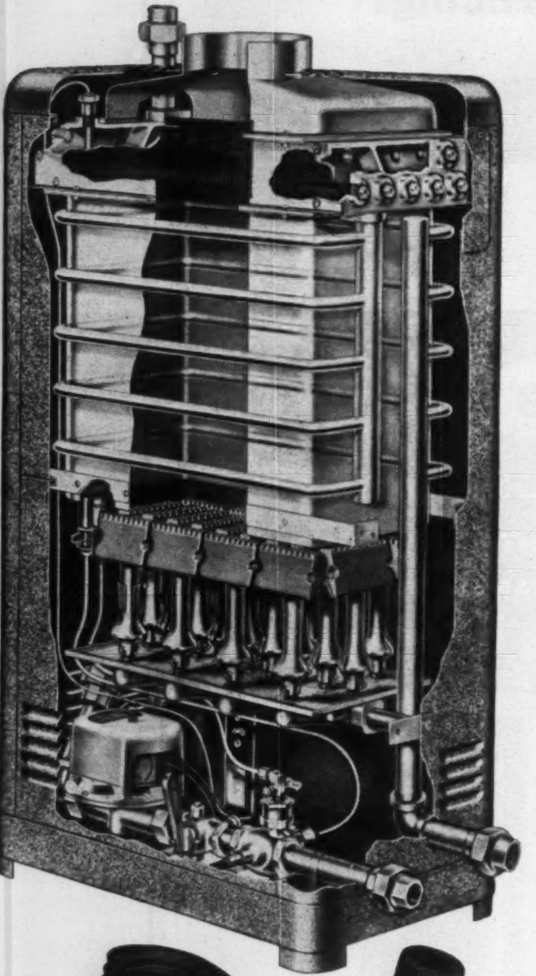
Hot water *always* on tap

Ruud Engineers Say

WOLVERINE TRUFIN® HAS "NINE TIMES THE CAPACITY"



In its nearly 70 years as a leading manufacturer of water heaters, Ruud Manufacturing Company of Kalamazoo, Michigan has established an enviable reputation for the outstanding efficiency and quality of its products.

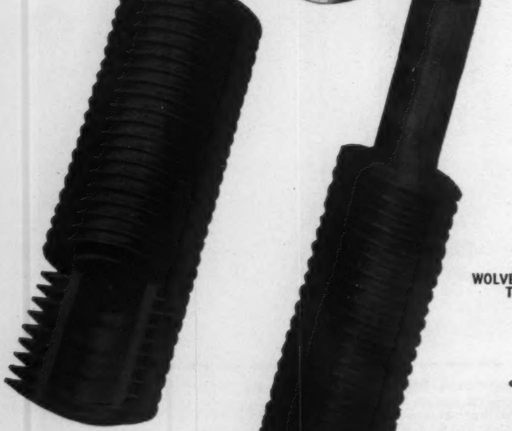
Contributing in a high degree to this efficiency and quality is Ruud's use of Wolverine Trufin — the integrally finned heat exchanger tube manufactured by Wolverine Tube.

Because of its great heat transfer capabilities Ruud uses high finned Trufin H/A and H/R as the heat exchangers of its water heaters. In describing these exchangers, Ruud engineers say **"The heat exchangers consist of copper fin tubes (Wolverine Trufin) having nine times the heat absorbing capacity of plain tubing of like diameter."**

Trufin's tremendous capacity to transfer more BTU's per foot of tube also helps Ruud design units that are extremely compact —requires only 3½ square feet of floor space. And because Trufin's fins are actually an integral part of the tube wall, they can never shake loose under the stresses of the temperatures and vibrations encountered in water heaters.

Wolverine Trufin is the original integrally finned heat exchanger tube. It is available in a wide range of alloys, types and sizes. If your product or manufacturing process calls for finned tube don't settle for substitutes. Like Ruud, specify Wolverine Trufin. For complete information write for your copy of the Trufin Catalog.

Wolverine Trufin is available in Canada through the Unifin Tube Company, London, Ontario.



TRUFIN TYPE H/R is used in the Ruud unit above because of its tremendous heat absorbing capacity.

MADE IN U.S.A.
TO THE STANDARDS
OF AMERICAN INDUSTRY
★★★★★★★

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DIVISION OF
CALUMET & HECLA, INC.
17256 Southfield Road
Allen Park, Michigan
Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

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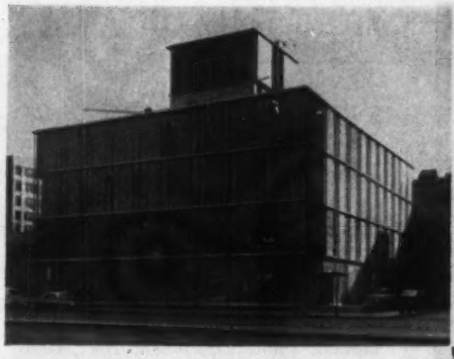
SALES OFFICES IN PRINCIPAL CITIES

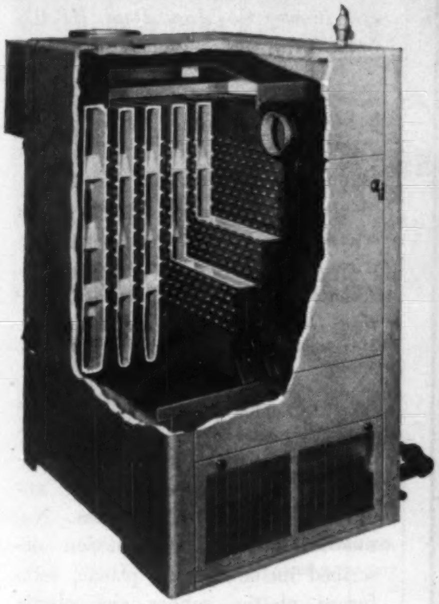
EXPORT DEPT., 13 E. 40TH ST., NEW YORK 16, N.Y.

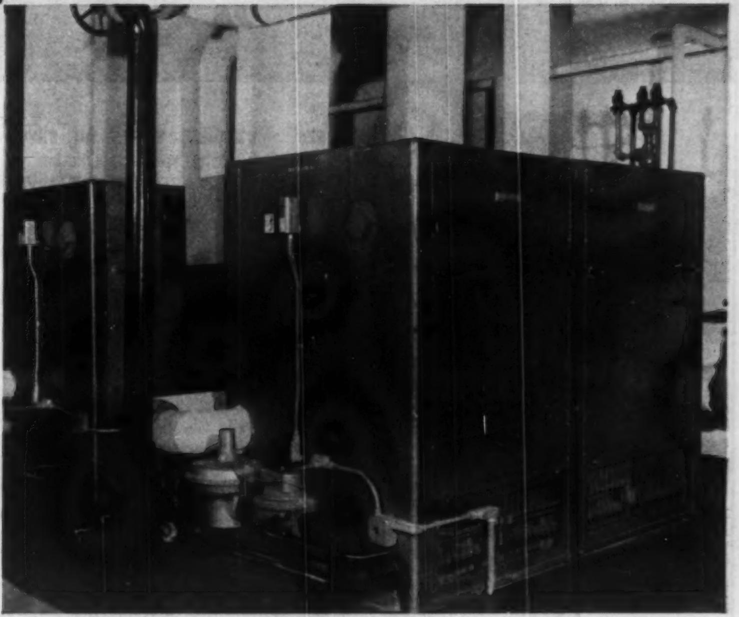


WEIL-McLAIN TYPE "J"

CAST IRON GAS BOILERS

MATCH MODERN DESIGN WITH MODERN EFFICIENCY





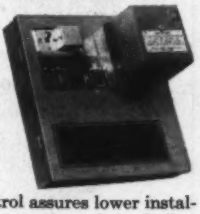
Installation of Weil-McLain Type J-18-W Gas Boilers in A. F. L. Medical Center Building, Philadelphia, Pa.

NEW FEATURES!

EASY-FIT HEADER

Assures correct header piping for proper steam development and release. Equipped with Dresser compression fittings—offers all the advantages of a swing header without the added erection costs. Machined and prefitted at the factory—shipped partially assembled, with all parts clearly marked for easy erection.

ELECTRONIC CONTROL PANEL



Reduces electrical work to a minimum. With its compact grouping of identified components, visual indication of operation and easily understood operating instructions, this electronic control assures lower installation cost and correct operation of the boiler.

Architect:
Louis J. Kahn, Philadelphia, Pa.

Mechanical Engineer:
A. Ernest D'Ambly, Philadelphia, Pa.

Mechanical Contractor:
Edward F. Roberts Co., Philadelphia, Pa.

Distributor:
Peerless Penna. Co., Philadelphia, Pa.

The selection of Weil-McLain Type "J" Gas Boilers for this installation assures heating efficiency as outstanding as the modern styling of the building.

In every detail, the "J" Boiler is designed to achieve *economy!* Not only in fuel consumption but in all the factors which contribute to low cost operation.

This boiler is *cast iron*—for long life and minimum repairs and maintenance. It is *compact,* requiring less floor space and head room. Assembly with short, multiple draw rods shortens erection time—assures a strain-free boiler. Its handsome jacket is completely insulated.

The Weil-McLain Type "J" Boiler burns all gases, including LP and LP-air and is equipped with controls for completely automatic, safe operation.

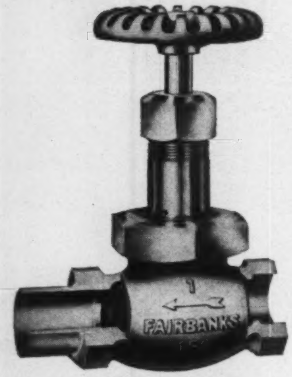
WEIL-McLAIN
BOILERS · RADIATORS

WEIL-McLAIN COMPANY
MICHIGAN CITY, INDIANA

Address literature requests to Dept. AA-38

insure permanent leakproof joints in copper or brass piping

Fairbanks THREADLESS Valves



"Fairco-Braze" Threadless Valves for silver brazed joints. Cut costs, speed installation of piping systems handling steam, hot or cold water, oil, compressed air, carbon dioxide, Freon and many other liquids and gases with Fairbanks "Fairco-Braze" Threadless Bronze Valves. Silver brazed joints permit the widest selection of materials as "Fairco-Braze" Valves in any type, through pressure ratings of 300 pounds steam working pressure, give permanent leakproof joints with copper, yellow brass, red brass, copper nickel, monel or steel pipe and type "B" copper tubing.

The silver brazed connection withstands tension, compression, torsion and vibration to a far greater degree than any other type joint and at the same time provides greater corrosion resistance.

Solder End Threadless Valves for soldered joints. Get perfect seal of valves for type "K", "L" and "M" copper tubing with Fairbanks Solder End Threadless Valves. Close fit of tubing and valve socket produces a capillary action that draws the molten solder in for the entire length and completely around the circumference of the connection. Simple, quick installation provides a smooth, compact, full flow assembly that has high resistance to corrosion.

Full line of Fairbanks Solder End Threadless Valves — Globes, Gates and Checks — have an unusually wide application range: ideal for hot and cold water lines, for low pressure steam lines, and underground water lines; in plumbing, heating, and air conditioning systems. Industrial uses include water, oil, air and vacuum lines, low pressure steam lines, pressure lubrication systems, dye lines in textile mills, liquor lines in breweries and distilleries.

FAIRBANKS
BRONZE VALVES
IRON VALVES
BALL VALVES
PLUG COCKS
UNIONS
CATALOG 51
THE FAIRBANKS COMPANY

YOURS ON REQUEST:

Fairbanks Valves Catalog, complete with cutaways, details, and specifications describing these Fairbanks Threadless Valves.

THE Fairbanks COMPANY
393 LAFAYETTE STREET
NEW YORK 3, N. Y.
BRANCHES:
NEW YORK 3 · BOSTON 10
PITTSBURGH 22 · ROME, GA.

VALVES
TRUCKS
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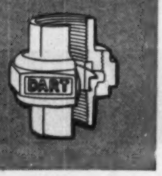
DART & PIC UNIONS



RECENT TRADE LITERATURE

Continued from page 262

▶ *FLUE GAS TEMPERATURE INDICATOR* — Manufacturer's bulletin covers function, installation, service, general information. Features cited: jewel pivots, automatic compensation, high accuracy, ample conductor cable, easy installation, large dial. Diagrams and specifications included. *Plant Equipment Div., General Blower Co., Inc., Dept. HPAC, 6412 Girard Ave., Philadelphia* 31.

▶ *FORGED STEEL FLANGES* — Technical data card FDC-251 on manufacturer's products lists available seamless welding fittings, seamless or welded tubular products, extrusions. *Babcock & Wilcox Co., Tubular Products Div., Welding Fittings Dept., Dept. HPAC, Milwaukee.*

▶ *FUME SCRUBBERS* — Bulletin B-71 shows scrubbers used in chemical plants, metal treatment, electroplating, refining, acid pickling, anodizing, and in laboratories. Numerous kinds of construction described including solid plastic, reinforced plastic, rubber and plastic lined steel, stainless steel. *Heil Process Equipment Corp., Dept. HPAC,* 12901 *Elmwood Ave., Cleveland* 11.

▶ *HEAT TRANSFER EQUIPMENT* — Four page bulletin 156 describes heat exchangers, immersion heaters, jet agitators constructed of graphite. Flow rates, effective heat transfer areas for standard multiple tube and concentric tube heat exchangers of various sizes given. Diagrams, illustrations of immersion heating units, electric immersion heaters, steam jet agitators provided. *Heil Process Equipment Corp., Dept. HPAC,* 12901 *Elmwood Ave., Cleveland* 11.

▶ *HIGH VELOCITY DUCT* — Special 24 page manual on design of ducts for high velocity heating and air conditioning systems available. Correct design procedure for 10 story building outlined in step-by-step com-from Chicago

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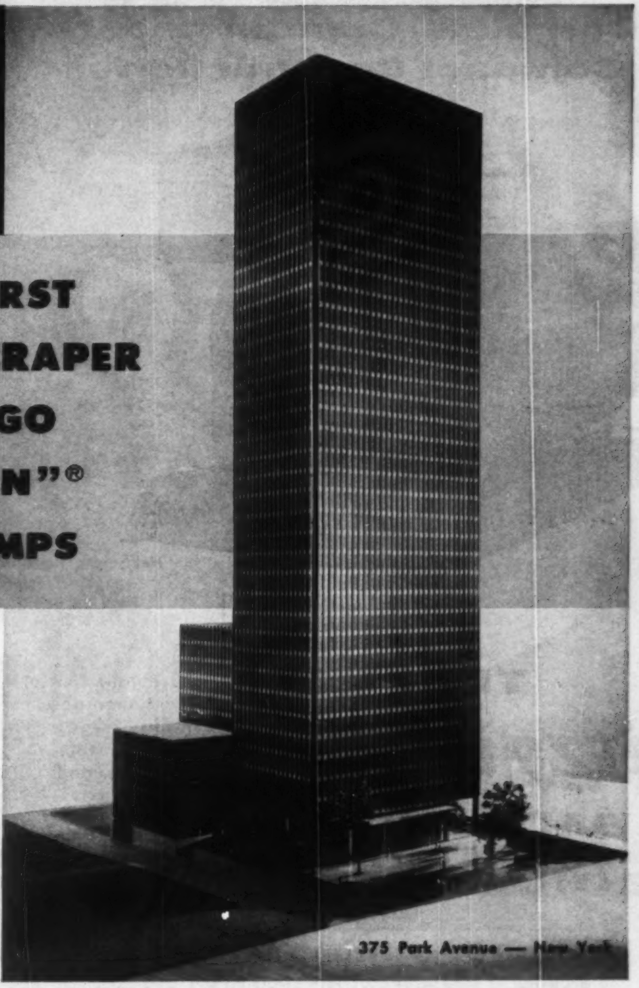
MODERN IN 2007 A.D.

WORLD'S FIRST BRONZE SKYSCRAPER HAS CHICAGO "FLUSH KLEEN"® SEWAGE PUMPS


375 Park Avenue — New York

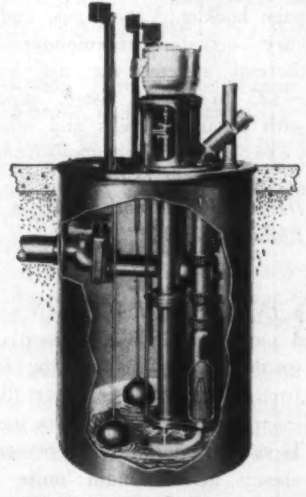
MIES van der ROHE and PHILIP JOHNSON
architects

KAHN & JACOBS
associate architects

JAROS, BAUM & BOLLES
mechanical engineers

GEORGE A. FULLER CO.
general contractors

EUGENE DUKLAUER, INC.
plumbing contractor


"FLUSH KLEEN"® Sewage Pump . . . Automatically Backwashes Strainer . . . Strainer Keeps Solids From Basin and Pump . . . Water Only Handled By Impeller.

- The new 375 Park Avenue Building, New York, literally has EVERYTHING— and *everything* is QUALITY. Quality ideas, plans, materials and workmanship have provided such modern conveniences as year-round peripheral zoned air conditioning with balanced humidity and finger-tip control, 18 electronically controlled high-speed elevators, closed circuit color television, special non-glare exterior glass walls, etc. Chicago "FLUSH KLEEN"® Sewage Pumps have provided for continuous, trouble-free waste disposal service.

More than 12,000 Chicago "FLUSH KLEEN"® Sewage Pumps have been installed as standard equipment in fine buildings everywhere — and NOT ONE HAS EVER CLOGGED. Only liquid reaches the pump impeller. There is no contact between the pump's working parts and coarse sewage material.

This is why Chicago Pump Company "FLUSH KLEEN"® Sewage Pumps have an unequalled record of clog proof performance and are preferred throughout the building industry.

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Complete, Coordinated, Compact Construction

THE
Fitzgibbons
PACKAGED
BOILER UNIT

For detailed information about this boiler — catalog sheets, brochures, and specifications — write today to the Fitzgibbons Boiler Company, address below.

Full wet back construction provides complete water jacketing of the entire rear combustion chamber. There are *no* refractory arches or walls to deteriorate and replace. Fitzgibbons has always pioneered this design.

Sizes up to 464 horsepower for oil or gas firing are available. *All* units are *factory tested* before shipment.

This is a complete unit — a "Scotch" type steel boiler with burner, fully automatic controls and safety devices, and the induced draft fan for cleaner, quieter operation at high efficiency without a stack.

Domestic hot water supply for any purpose is constantly and effectively furnished through the famous Fitzgibbons "Tanksaver"® — a finned, copper coil submerged in the boiler where the water is the hottest.

Select the unit backed by the name "FITZGIBBONS."

Fitzgibbons
Boiler Company, Inc.
Sales and Executive Office: 101 Park Ave., New York 17, N. Y.
Field Sales Office and Plant: Oswego, New York.
DEPT. 20

SINCE 1886

FB116

RECENT TRADE LITERATURE

Continued

putations. Information on duct construction and insulation provided. Eleven pages of performance tables also given. *Anemostat Corp. of America, Dept. HPAC,* 10 *E. 39th St., New York* 16.

▶ *INDICATING CONTROLLERS* — Indicating controllers for automatic control of pressure or temperature, transmitters for pressure or temperature indication, receiver gages in various designs, ranges and degrees of accuracy and sensitivity described in 16 page catalog. Information on helical "Bourdon" tube pressure elements, vapor gas and organic liquid temperature sensing systems included. *United States Gauge, Div. of American Machine and Metals, Inc., Dept. HPAC, Sellersville, Pa.*

▶ *INDICATING, RECORDING, CONTROLLING THERMOMETERS* — Catalog C60-2 describes line of rectangular case filled system thermometers. Indicators, recorders, transmitters, electric, or pneumatic control instruments covered in 56 page booklet. Vapor, gas, and mercury actuated thermometers and thermal systems for use between −125 to 100 F listed, explained, with separable wells and other accessories. *Minneapolis-Honeywell Regulator Co., Industrial Div., Dept. HPAC, Wayne and Windrim Aves., Philadelphia* 44.

▶ *INDUCED DRAFT FAN* — New 4 page bulletin 3-350 describes forward curved fans ranging in size from 18¼ to 80¾ in. Chart illustrating pressure characteristics included. Is said to operate at 78 percent efficiency at minimum noise levels. *Chicago Blower Corp., Dept. HPAC,* 9863 *Pacific Ave., Franklin Park, Ill.*

▶ *INDUSTRIAL WATER COOLERS* — Recently released 4 page bulletin 106 covers industrial water cool-

In 8 seconds Pittsburgh Superfine Fiber Glass Insulation is applied to a boiler panel with adhesive. On high-tack enamel finishes, Superfine is applied directly over the paint and baked on at 260° F.

"Pittsburgh Superfine fiber glass has satisfied our boiler insulation demands in every way"

—says Mr. E. J. Renner, Project Engineer, National-U.S. Radiator Corporation, Duncansville, Pennsylvania

"We use Pittsburgh Superfine to insulate boilers for home and commercial use," says Mr. Renner. "In comparison with the insulating material previously used, Pittsburgh Superfine has given us four advantages:

1. **EASIER TO HANDLE.** "It's lightweight, easier to warehouse, easier to move during manufacturing.
2. **CLEANER.** "Former material came in bags which sometimes broke, making an extra clean-up chore.
3. **EASY TO CUT.** "Cutting Superfine Fiber Glass requires no extensive layout or complicated system. Operator uses a 10-in. kitchen-style knife for this easy job.
4. **SHIPPING COSTS CUT 10%.** "On coal-fired and gas-fired boilers, insulation is applied by the contractor or the distributor. When we shipped former type insulation to them, special wire-bound crates were required. Now we ship Superfine Fiber Glass in cardboard containers and save 10% on shipping costs.

"We use one-inch, half-pound density Superfine to reduce heat loss in the boilers. This insulation is so effective that at normal temperatures—150° F to 212° F—the boiler exterior is only slightly above room temperature. Greater bulk of the other type insulating material would be required to do the same job."

HOW CAN PITTSBURGH SUPERFINE HELP YOU?

Let us show you! We'll be glad to work on your insulation problems with you right in your own plant. For technical assistance, call your nearest PPG Sales Office or write us direct. *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

Light-weight, easily handled Superfine is quickly cut with kitchen-type knife. Use of Superfine cuts shipping costs 10% on two types of boilers at National-U. S. Radiator.

PITTSBURGH SUPERFINE INSULATION IS A PRODUCT OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PPG GLASS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

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FROM WEINMAN, for the air conditioning industry...

SPECIALIZED PUMPS

WEINMAN TYPE AC UNIPUMPS are designed *specifically* for use in circulating cooling water through condensers, compressors, and direct cooling units and over cooling towers in air conditioning systems.

The compact size and versatile mounting features of WEINMAN TYPE AC UNIPUMPS simplify installation in even extremely limited space. They work in any position . . . can be mounted on floor, ceiling or wall, with the shaft horizontal, vertical or at an angle.

A specially designed seal prevents leakage caused by the abrasive action of dust laden liquids.

Available in a great variety of sizes with a wide choice of motors, WEINMAN TYPE AC UNIPUMPS will give long life, trouble free, high capacity pumping service in any installation.

Attention Air Conditioning, Heating and Ventilating engineers, contractors, equipment manufacturers . . . eliminate many pump problems by installing WEINMAN TYPE AC UNIPUMPS. Write today for a free copy of illustrated WEINMAN Bulletin No. 100. Gives specifications, dimensions, construction features, performance curves and complete selection table.

THE WEINMAN PUMP MFG. CO.
290 SPRUCE ST. COLUMBUS 8, OHIO

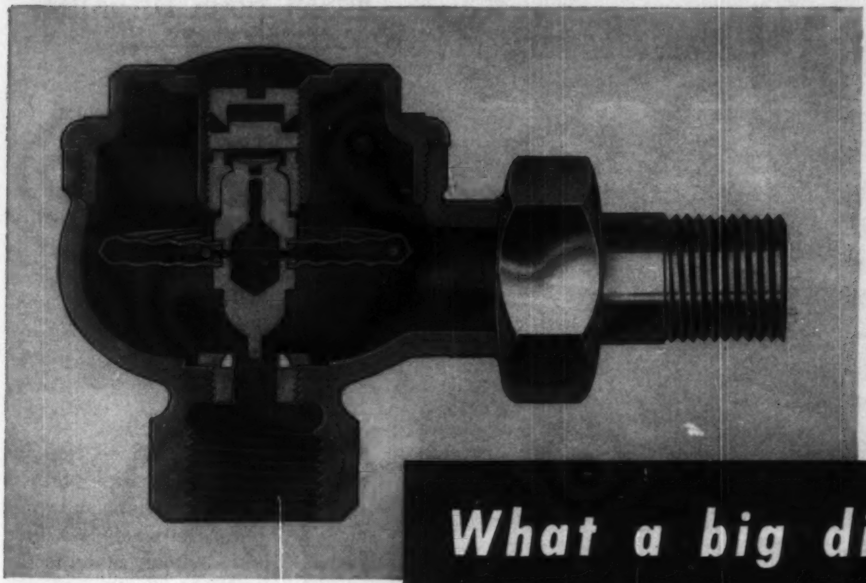
ers for diesel or gas engines, air compressors, plastic molds, other closed systems. Centrifugal fan draw-through units, centrifugal fan blow-through units, propeller fan blow-through units are described. *Baltimore Aircoil Co., Inc., Dept. HPAC, P.O. Box* 7322, *Baltimore* 27.

▶ *INERT GAS SHIELDED WELDING* — New 24 page catalog 2300 describes inert gas shielded tungsten arc welding process for rapid joining of light gages of most engineering metals, alloys. Process — which utilizes inert gas to shield welds from atmospheric contamination — has been refined, expanded to include use of line of manual, semi-automatic, automatic accessory equipment, company says. *Air Reduction Sales Co., Div. of Air Reduction Co., Inc., Dept. HPAC,* 150 *E. 42nd St., New York* 17.

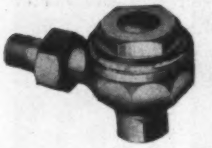
▶ *LARGE INDUCTION MOTOR* — New 16 page bulletin 1950 presents detailed information on full line of motors in ratings 150 to 1250 hp. Illustrations show protection offered by open dripproof, splashproof, enclosed and explosionproof enclosures in which motors are built. *Louis Allis Co., Dept. HPAC,* 427 *E. Stewart St., Milwaukee* 1.

▶ *MASONRY DRILLS* — New 40 page catalog 24 contains information about 29 anchoring products with hints on drilling, typical applications. Among data included: tables on "Rawl-drill" shanks, "Rawl-chuck" sizes for power drills; holding power tables for guidance in determining proper anchor for amount of holding power required; two charts showing anchors suited for 15 different types of masonry. *Rawlplug Co., Dept. HPAC,* 250 *Petersville Rd., New Rochelle, N. Y.*

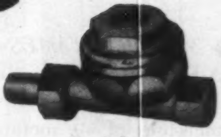
▶ *METERING PUMPS* — New bulletin 1157 describes metering pumps with diaphragm liquid ends. Capaci-



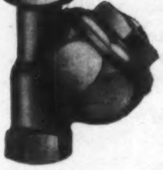
What a big difference a trap can make!



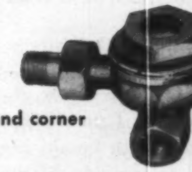
Angle



Straightway



Vertical



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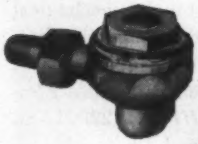


Right hand corner

Marsh Packless Radiator Valves are perfect team mates for Marsh Radiator Traps. The metal-to-metal seal places them in a class all their own.

Yes, the success or failure of a steam distribution system can hinge on things as small as radiator traps. That's why it pays to use Marsh Radiator Traps—traps that are individually and permanently adjusted to close tight on steam, but open promptly and pass air or condensate at temperatures only a few degrees below closing temperature.

The part that provides positive operation in Marsh Radiator Traps is that rugged-but-sensitive thermostatic diaphragm. After this element has been assembled it is made completely seamless by a heavy overall deposit of copper. It is then filled with an accurately measured charge of volatile fluid; finally tested by expert operators to make sure that its expansion and contraction is exactly right to produce the utmost efficiency and economy.

Construction throughout is in keeping with the effective diaphragm. Bodies are of extra heavy cast brass suitable for pressures up to 125 lbs. steam. Bonnet assemblies of a given type and size are interchangeable. Trap seats are renewable. All components are made with a large safety factor beyond rated operating pressures.

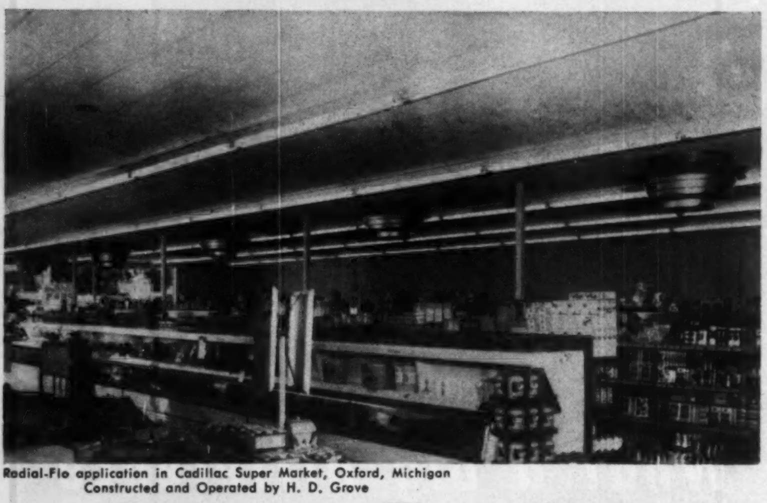
Next time make it Marsh throughout and see the difference . . . Marsh traps, packless valves, bucket traps, venting valves. All are covered in the new fact-filled catalog.

MARSH INSTRUMENT CO. *Sales Affiliate of Jas. P. Marsh Corporation* **Dept. T, Skokie, Ill.**
Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd St., Edmonton, Alberta

MARSH

Heating Specialties **SINCE 1865**

PATENTED **NORMAN** SEALED COMBUSTION



Radial-Flo application in Cadillac Super Market, Oxford, Michigan
Constructed and Operated by H. D. Grove

Norman Three-Sixty®

Gas-Fired **UNIT HEATERS**

answer more jobs better

Operating completely independent of room air, Norman Three-Sixty Unit Heaters can be installed in many applications where other unit heaters may fail.

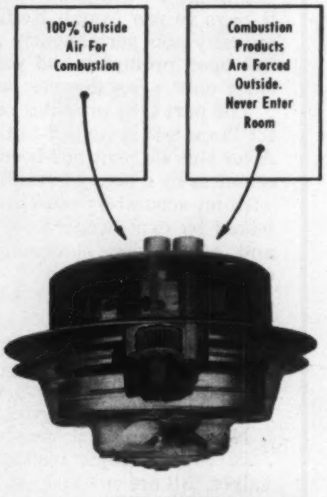
They are especially suitable for super markets, bakeries, restaurants, meat shops, candy stores and other locations where combustion products entering the room threaten contamination.

Norman Three-Sixty Unit Heaters are particularly adaptable to drug stores, variety stores, dry cleaners or wherever exhaust fans create a negative pressure that may cause pilot outage.

Two Types, Two Sizes

Radial-Flo units gently distribute a complete circle of warm air downward and outward. Down-Blo units provide direct, spot heating from high ceilings—excellent for blanketing vestibules, lobbies and doorways of garages, repair shops, warehouses and other entries exposed frequently to the outside weather.

Both Radial-Flo and Down-Blow models available in 85,000 or 115,000 BTU/hr. inputs.


100% Outside Air For Combustion
Combustion Products Are Forced Outside. Never Enter Room

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FOR COMPLETE INFORMATION**

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Norman® products company

NORMAN PRODUCTS CO.
1156 Chesapeake Ave., Columbus 12, Ohio
We want to learn more about Norman Three-Sixty Unit Heaters.

NAME____
COMPANY NAME________________________________
ADDRESS______________________________________
CITY____________________ZONE____STATE____________
See Sweet's Arch. File 30C/No, American Sch. and Univ. Annual C-1/No

RECENT TRADE LITERATURE

Continued

ties, pressures, materials of construction of units for metering corrosive, obnoxious, toxic chemicals given. Another bulletin, 1257, describes controlled volume pumps engineered for applications which require laboratory accuracy with industrial ruggedness. Details on specifications, design features, materials of construction, dimensions provided. *Milton Roy Co., Dept. HPAC,* 1300 *E. Mermaid Ln., Philadelphia* 18.

▶ *MOTOR CONTROLS* — New 56 page catalog 5800 presents information on magnetic starters and contactors, drum controllers, pressure switches, push buttons, other motor control pilot devices. Horsepower, motor speed, heater size and heater ampere ratings plus enclosure choices combined in one table. *Furnas Electric Co., Dept. HPAC,* 1041 *McKee St., Batavia, Ill.*

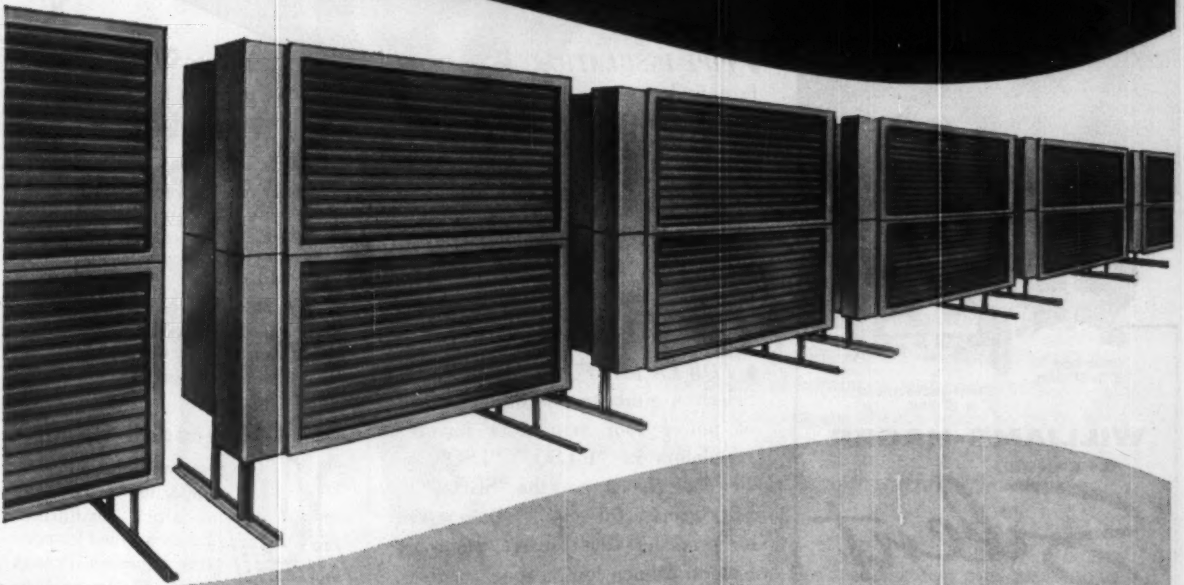
▶ *MOTOR FRAMES* — "Compar-A-Frame" bulletin B-1284-1 gives NEMA frame assignments overall dimensions of a-c motors in new sizes 364U to 445U. Bulletin explains how to compare dimensions of "Series C" motors with "Series D" line. *Reliance Electric and Engineering Co., Dept. HPAC,* 24701 *Euclid Ave., Cleveland* 17.

▶ *MOTORS*—New 4 page bulletin describes 1 to 40 hp squirrel cage motors with "multi-gage protection"; said to provide lifetime seal against chemicals, moisture, mechanical shorts, vibration, dust and dirt abrasion. Literature covers design extras. Specifications included. *Lincoln Electric Co., Dept. HPAC,* 22801 *St. Clair Ave., Cleveland* 17.

▶ *PACKAGED BOILERS*—Six page specification sheet emphasizes ability of line of package boilers (670,000 to 6,700,000 Btu) to accept recirculated water from return lines with wide temperature differentials. Space economy, low fuel consumption

KRAMER

UNICON for UNLIMITED TONNAGE



Kramer Unicon has brought a new era into the industry. With more than 20 years of unique practical experience and know-how in dry condensing, Kramer again offers new avenues of opportunity to the air conditioning and refrigeration industry.

Unicon now has no capacity limit. Standard Unicon systems up to 540 tons are now cataloged for the first time.

Unicons for heat pump applications are now also available with no horsepower limitations.

Kramer engineering and design has proven that the Unicon can move large volumes of air with extreme quietness.

Unicon has long proven by actual experience that it is free from fouling or corrosion and requires practically no maintenance.

The total operating weight per ton for Unicon is very low, resulting in minimum platform and reinforcement requirements.

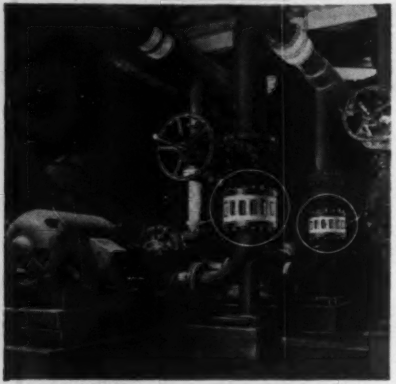
Unicon space requirements are surprisingly small; a 300 ton system requires only 15′ x 14′ floor space and is 12′ high.

WRITE FOR BULLETIN U-391

KRAMER TRENTON CO. • Trenton 5, N.J.

44 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

STOP
SURGE-PRESSURE
DAMAGE
in Air Conditioning Systems



Installation in 525 William Penn Place Building in Pittsburgh.

Globe type for 3" to 24" lines.

Center-guided type for 1" to 10" lines.

WILLIAMS-HAGER
FLANGED
Silent
CHECK VALVES

Surge pressures . . . and resulting water hammer . . . are effectively controlled by these valves. They close instantly whenever flow reversal starts, or when flow is zero—providing dependable protection for piping, pumps and other components in air conditioning systems.

Write for Bulletins:
No. 654 on the Valves
No. 851 on Cause, Effect and Control of Water Hammer

THE WILLIAMS GAUGE CO., INC.
155 Stanwix Street
2 Gateway Center Pittsburgh 22, Pa.
Our 72nd Year • 1886-1958

RECENT TRADE LITERATURE

Continued

also stressed. Details, diagrams, graphs included. *Cyclotherm Div., National-U.S. Radiator Corp., Dept. HPAC, Oswego, N. Y.*

▶ *PANEL COIL* — New bulletin describes panel coil for industrial heating, cooling processes. New unit made of variety of metals to meet various requirements. Illustrations provided. *Dean Thermo-Panel Coil Div., Dean Products, Inc., Dept. HPAC,* 616 *Franklin Ave., Brooklyn.*

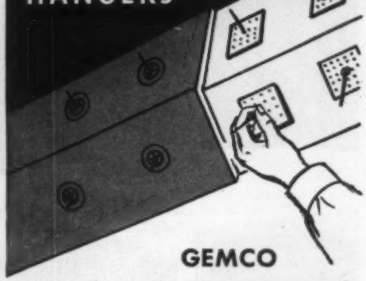
▶ *PIPE INSULATION* — New slide fact finder gives insulation surface temperature, Btu loss per lineal foot per hour for various insulation thicknesses on pipe ranging 1 to 24 in. in diameter where pipe temperature is 300 to 1200 F. *Union Asbestos & Rubber Co., Dept. HPAC,* 1111 *W. Perry St., Bloomington, Ill.*

▶ *POWER ROOF VENTILATOR* — Selection guide to low silhouette line of power roof ventilators includes ventilators in "L-LSQ," "LSQ" series for exhaust, and the "SRQ," "L-SRQ" series for supply. Data given on propeller fans; direct connected motors. Dimensions, capacity tables, details on accessories and protective coatings included. *Ilg Electric Ventilating Co., Dept. HPAC,* 2850 *N. Pulaski Rd., Chicago* 41.

▶ *PROCESS EQUIPMENT* — New bulletin details facilities, services, qualifications of company for chemical, process, food, beverage, pharmaceutical, power, heating, metal refining industries. Illustrations of typical work such as code pressure vessels, storage tanks, heat exchangers, scrubbing towers, autoclaves, electrolytic cell cathodes presented. *Niagara Welding & Boiler Works, Inc., Dept. HPAC,* 811 *Linwood Ave., Niagara Falls, N. Y.*

▶ *PROTECTIVE COATINGS* — New 8 page brochure presents in-

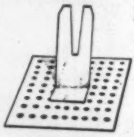
SAVE TIME—
SAVE MONEY
with these dependable
INSULATION HANGERS



GEMCO
Spindle Hangers and W-A Self-Locking Washers

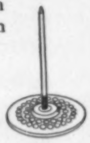
Ideal for insulation work, Gemco Spindle Hangers are easily and quickly installed . . . with positive adhesion to concrete, brick or metal. W-A Self-Locking Washers pressed over spindles with minimum effort and lock insulation securely in place.

GEMCO Pronged Hangers



Designed especially for supporting various types of block insulation. Easily applied for positive adhesion. Prongs (available in various lengths from 1$\frac{3}{16}$" to 6$\frac{7}{8}$") bend over to hold insulation firmly in place.

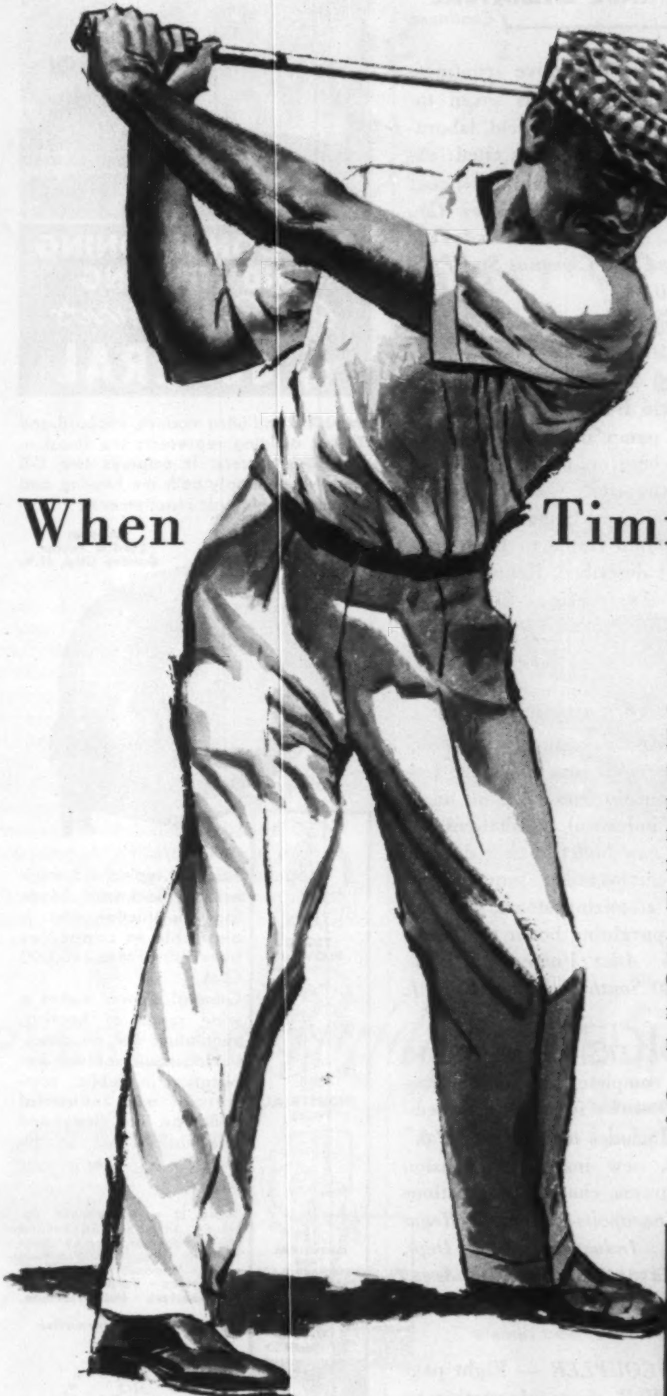
TUFF-WELD Nylon Hangers



Two-piece hangers . . . with bases of tough, mold nylon and spindles of metal. Made especially for smooth surfaces. Spindles snapped into bases as needed; reduces inventory, storage space, freight costs. W-A Self-locking washers hold insulation securely in place.

TUFF-BOND Quik-Set Adhesive (for smooth or slightly irregular surfaces) and General Purpose Adhesive (for rougher surfaces) assure permanent adhesion of hangers when used as directed. Write or wire for details and specifications.

GOODLOE E. MOORE
INCORPORATED
DANVILLE 40, ILLINOIS



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Emerson-Electric is ready to help you *right now* with any power-drive problem. In your highly competitive business, tomorrow can be too late. Skilled specialists who know motors and the needs of appliance and equipment manufacturers are always ready to go to work for you. They'll start with your design ideas—follow through to production and tested performance.

It is this on-the-spot service, plus more than 65 years' experience meeting motor-drive requirements, that have made Emerson-Electric motors foremost in appliance applications.

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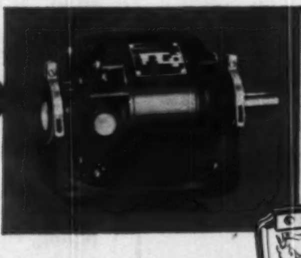

Every Emerson-Electric motor is custom-engineered to meet your exact requirements.

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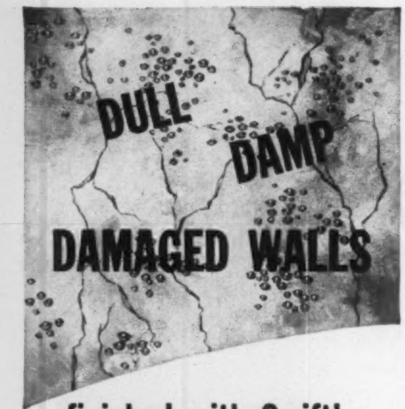

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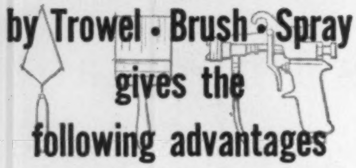

CLEAN WHITE SURFACE
GOOD COLOR STABILITY
GOOD CHEMICAL & MOISTURE RESISTANCE
FIRE RETARDANT
RESISTS MOLD AND RODENTS
WASHABLE

It's not a plaster . . . not a paint. Swift's Adcote wall finish was especially developed to provide industrial users with a high moisture resistant finish that is easy to apply yet has good adhesion to many different surfaces and presents a clean, white, uniform appearance.

One trial is worth a thousand claims.

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Name____________________
JUST CLIP TO LETTERHEAD AND MAIL

RECENT TRADE LITERATURE

Continued

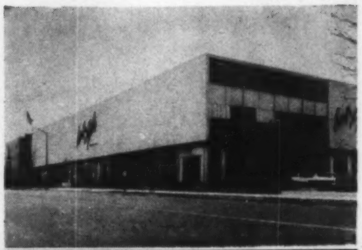
formation on protective coatings. Typical uses of products given together with summary of field, laboratory tests. Among features cited: excellent adhesion, durability, wear resistance. *Industrial Finishes Co., Inc., Dept. HPAC,* 1119 *Land Title Bldg., Broad and Chestnut Sts., Philadelphia* 10.

▶ *PUMP MOTORS* — Pump motors 1/8 to 1000 hp discussed in new 4 page bulletin B-2507. Units designed for every pump in all types of industries wherever prime mover of fluids is required. Concept for attaching machined motor frame directly to pump frame to form integrated unit described. *Reliance Electric and Engineering Co., Dept. HPAC,* 24701 *Euclid Ave., Cleveland* 17.

▶ *PURGE SEQUENCE VALVE* — New steam purge sequence valve designed to provide secure, hazard free means of purging, scouring oil burner tips in industrial installations described in new bulletin. Unit dictates inflexible, irreversible sequence in control of atomizing steam, fuel oil, steam for purgining boiler tips, company says. *Atlas Valve Co., Dept. HPAC,* 280 *South St., Newark, N. J.*

▶ *PYROMETERS*—Catalog G100-8 describes complete line of thermocouple accessories for measuring temperature. Includes new "Meg-O-Pak" assemblies, new insulated extension wire. Diagrams, charts, specifications given. *Minneapolis-Honeywell Regulator Co., Industrial Div., Dept. HPAC, Wayne and Windrim Aves., Philadelphia* 44.

▶ *QUICK COUPLER* — Eight page catalog F-10-R gives information on quick couplers for use on hoses, piping, equipment. Available in sizes 1/2 through 6 in. in variety of styles, materials. Dimensional drawings, pressure temperature ratings, chemical service recommendation chart provided. *Jordan Industrial Sales*



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Air Requirements
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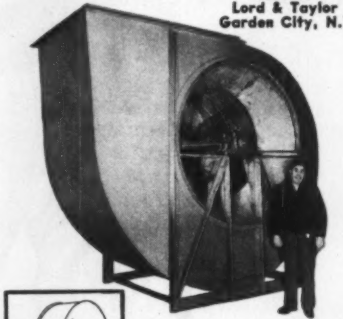

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INDUSTRIAL FANS
CENTRIFUGAL FANS BACKWARD BLADE FORWARD CURVE
GENERAL BLOWERS ARE CUSTOM ENGINEERED
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This is a typical GB engineered backward blade fan construction and is available in capacities from 700 CFM to 240,000 CFM.

General Blower makes a wide range of heating, ventilating and air conditioning equipment for application in public, commercial and industrial buildings. For first hand information, call on the GB sales engineer in your area.

There is a GB blower for every purpose. Backward blade, forward curve centrifugal fans - Util-A-Vent sets - Propeller fans - Fume exhausters - Turbo blowers - Gas boosters - Industrial fans.

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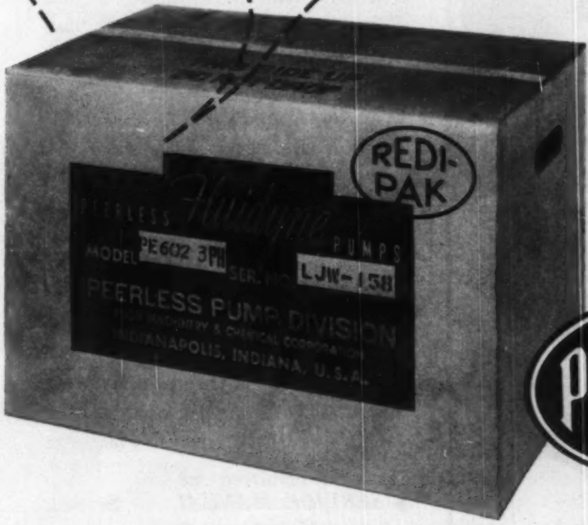
INSIDE, A 2-HP **FLUIDYNE** END-SUCTION PUMP...

IT IS *ONE* OF THE MOST COMPLETE LINE OF GENERAL PURPOSE PUMPS


REDI-PAK
PEERLESS Fluidyne PUMPS
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The Peerless Fluidyne end-suction pump line offers characteristics to fit exactly your system's piping. Literally thousands of combinations are available: electric, engine, or belt drives; close or flexible coupled types; HP ranges from ¼ to 150 HP; capacity range from 10 to 5500 gpm; head range from 2 to 260 ft. All Fluidyne pumps are compactly designed, highly dependable in operation, have excellent hydraulic and head-capacity characteristics, make a neat-appearing, trim installation. For complete information on the entire Fluidyne line, mail the coupon today.

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PREPACKED and ready for immediate service, this Fluidyne is one of the 22 popularly sized pumps, from 1 to 15 HP, that comprise the quickly available, economical REDI-PAK line.

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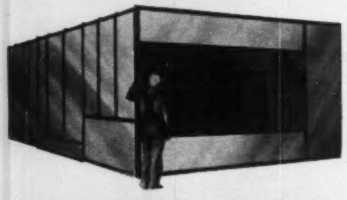

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RECENT TRADE LITERATURE

Continued

Div. of OPW Corp., Dept. HPAC, 6013 Wiehe Rd., Cincinnati 13.

▶ *RELIEF VALVES* — Catalog 110 describes adjustable, spring actuated relief valves. Units furnished in two models, each available in six sizes. One model has adjustable pressure range 5 to 35 psi; other has range 35 to 100 psi. Special springs permit use with pressures to 200 psi. Sizes in both models ranges 3/8 to 1½ in. NPT. Performance curves, dimensions, parts specifications provided together with illustrations. *Tuthill Pump Co., Dept. HPAC,* 939 *E.* 95*th St., Chicago* 19.

▶ *SEAMLESS TUBING* — Technical data card TDC-115D furnishes information taken from new edition of steel tubular products section of AISI Steel Products Manual. Card covers dimensional tolerances—both cold drawn and hot finished—of round, seamless carbon and alloy steel mechanical tubing in various conditions of heat treatment. *Tubular Products Div., Babcock & Wilcox Co., Dept. HPAC, Beaver Falls, Pa.*

▶ *SERVICE MANUAL* — Seventh edition of service manual covers installation, maintenance, service of "B-60" selfpowered gas system, thermostats, pilot generators, fan and limit controls, transformer relays, thermopilot valves. Guide for use of millivolt meters included. Illustrations provided. *General Controls Co., Dept. HPAC,* 801 *Allen Ave., Glendale, Calif.*

▶ *SMOKE STACK*—Details, specifications on permanent refractory smoke stack in sizes 10 to 30 in. diam given in new 8 page bulletin IS-32. Greater draft, aluminum jacket, easy installation cited as special features. *Van-Packer Co., Div. of Flintkote Co., Dept. HPAC, P.O. Box No.* 306, *Bettendorf, Iowa.*

▶ *SQUARING SHEARS* — New 12 page bulletin 80-FC describes design,

"In this Union there is strength"

...it's **CAPITOL**

300# forged steel UNION!

Continual testing and inspection assure water-tight seat, close tolerance and accurate threads.

- Brass or integral steel seat
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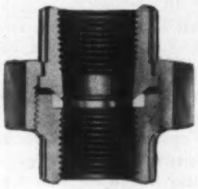
- Meets all Federal Specifications



the U.L. label guarantees quality

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Available from stock in sizes ½" through 2", 300# steam or 2000# cold water, oil or gas, non-shock.

Order all your fittings from

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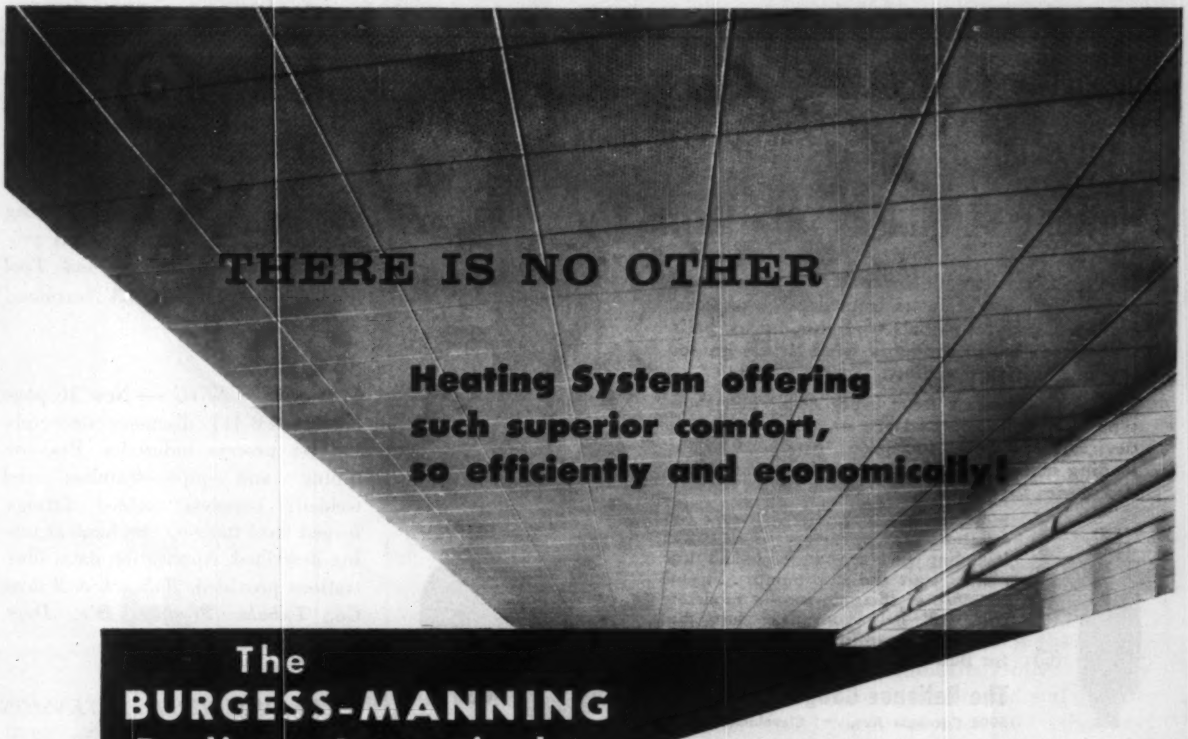
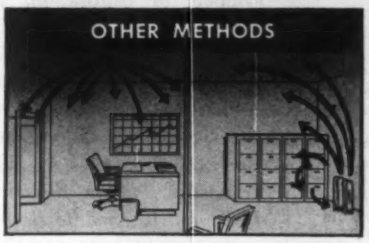
COUPLINGS — NIPPLES — UNIONS — BUSHINGS — PLUGS — REDUCERS — CAPS—CAPADAPTERS—WELL SUPPLIES

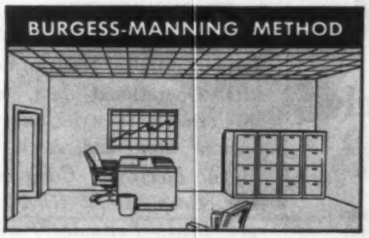


THERE IS NO OTHER

Heating System offering such superior comfort, so efficiently and economically!

The
BURGESS-MANNING
Radiant Acoustical Ceiling





Remember
Your Building is better
Your Building Budget no Bigger

The only completely integrated radiant heating, cooling and acoustical ceiling.

Radiant Energy, Nature's own ideal method for providing physical comfort, is utilized by the Burgess-Manning Radiant Acoustical Ceiling in the comfort conditioning of institutional and commercial buildings. It is the only heating system, applicable to such buildings, that successfully integrates radiant heating, cooling and acoustical control in a single unit, and that performs each function with complete satisfaction, efficiently and economically.

Heating and cooling are accomplished entirely without draft producing air currents. Temperatures are more uniform thruout the room, with no cold spots or overheated areas—and with no appreciable variations in temperature from floor to ceiling. The floors are always warmer than room temperature.

All these comfort advantages are obtained without additional building cost, and with actual operating economies. Before erecting your next building, investigate the Burgess-Manning Radiant Acoustical Ceiling—it is the most modern, fully tried and tested comfort conditioning system known today.

Write for Burgess-Manning Catalog No. 138-2H

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IN SWEET'S ARCHITECTURAL FILE
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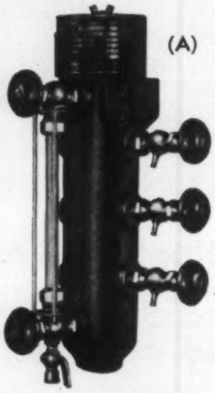
3 Heating Cooling Acoustical

BURGESS-MANNING COMPANY
Architectural Products Division
5970 Northwest Highway, Chicago 31, Ill.

Low Cost Protection

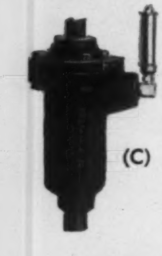
for small boilers and tanks...

Reliance Liquid Level Alarms

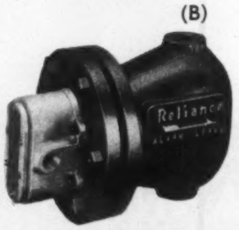


Don't get caught with low water — the cause of a third or more of losses from damage to steam boilers. Use extra signals — lights, horns, bells, whistles to reach operators when levels go too low or too high for safety.

Reliance Levalarms serve every need. Electrode-type (A), float operated (B) or steam (C), these devices are positive, fool-proof, produced by the leading maker of boiler water columns and gage accessories for 74 years.



Most versatile is the electrode-type (A) available for a variety of facilities including fuel cut-out, high and low alarms, start and stop pumps . . . One or more of these devices, at moderate cost, will help you make sure that liquid level warnings are heeded. Write for Bulletins D1 and D3.



The Reliance Gauge Column Co.
5902 Carnegie Ave. • Cleveland 3, Ohio

Reliance Boiler Safety Devices since 1884

Cross section shows structural superiority of Aeromaster's new, extruded aluminum-alloy blades in diameters from 9' to 22'.

NEW! EXTRUDED ALUMINUM Blades on AEROMASTER* fans only

AEROMASTER'S new, extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure and the superior strength of wrought metal... Silicon-magnesium aluminum alloys resist corrosion. Their fine grain structure, high tensile strength and increased endurance eliminate danger from wear, vibration, and metal fatigue... true airfoil blade sections assure maximum air delivery... adjustable blade pitch angle permits decrease of fan load to an accurate minimum horsepower requirement.

The AEROMASTER fan is easily assembled *in the tower.* No special handling equipment is necessary. AEROMASTER fans cost less to install, less to operate, less to maintain!

For more details write to KOPPERS COMPANY, INC., Aeromaster Fan Dept., 6803 Scott Street, Baltimore 3, Maryland.

KOPPERS **Aeromaster Fans**
Engineered Products Sold with Service

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RECENT TRADE LITERATURE

Continued

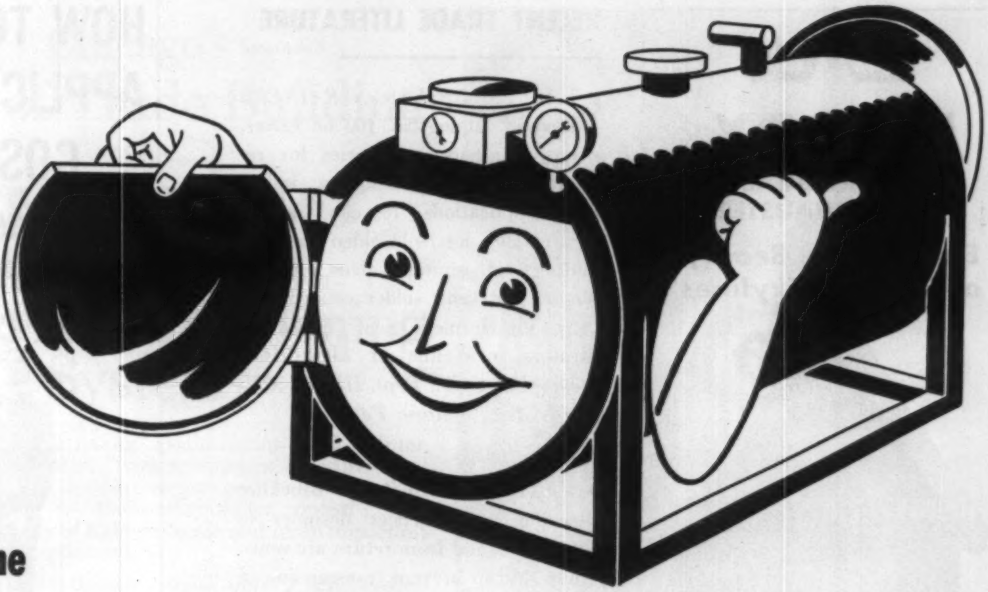
operating features of squaring shears for light sheet metal working. Features of series "F" and "G" with 18 in. gap highlighted together with more than 25 illustrations. Cutting lengths, capacities of all models provided. *Niagara Machine and Tool Works, Dept. HPAC, 683 Northland Ave., Buffalo* 11.

▶ *STEEL TUBING* — New 16 page booklet TB-417 discusses steel tubing for process industries. Pressure tubing and pipe—seamless and welded; seamless welded fittings, forged steel flanges; mechanical tubing described. Application data, illustrations provided. *Babcock & Wilcox Co., Tubular Products Div., Dept. HPAC, Beaver Falls, Pa.*

▶ *THERMOCOUPLE EXTENSION WIRES*—Revised catalog No. 32 illustrates many types of thermocouple and extension wires according to insulation, construction. Identification symbols of calibration, gage sizes listed with each type. Charts included with information on calibration symbols with information on calibration symbols and wire color codes, wire resistances, weights and electrical properties, insulation characteristics. *Thermo Electric Co., Inc., Dept. HPAC, Saddle Brook, N.J.*

▶ *TRANSFORMERS* — New catalog covers pulse and coupling transformers, pulse transformer sample kits. Operational data, test circuit diagrams, case styles, other data for custom built and stock units provided. *Electronic Components Div., ESC Corp., Dept. HPAC,* 534 *Bergen Blvd., Palisades Park, N.J.*

▶ *VALVE APPLICATIONS* — Series of folders entitled *The Evidence in the Case* reports on performance of "LQ600" valves in severe applications. Illustrations of each valve application included. *Lunkenheimer Co., Dept. HPAC, Box* 360, *Cincinnati* 14.



The Boiler that doesn't show its age

The practical, two-pass design of the Continental Automatic Boiler is a long-life feature that cuts operation and maintenance cost. The hinged doors – front and back – open on the burner. No baffles or partitions that can be damaged in routine servicing. No take-out, put-back refractories.

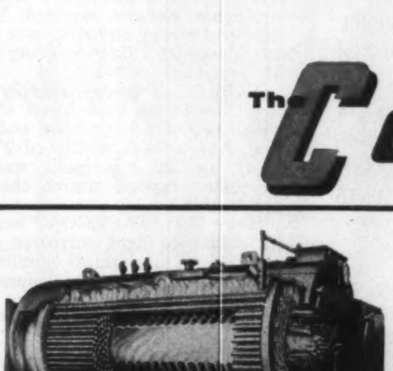
Continental's exclusive "spinning gas" technique heats all return tubes fully and evenly in just two passes, assuring longer service life. Free, rapid water circulation improves heat transfer and keeps heating surfaces clean.

Low maintenance is just one of the cost-saving features of the Continental Automatic Boiler. Every Continental is fire-tested and guaranteed for better than 80% efficiency. Owners report fuel savings up to 33% . . . and Continental efficiency stays constant over a wide load range and a long service life.

Continental Boiler Service, available from coast to coast, includes aid and supervision in start-up, operating instruction for attendants, competent and dependable service when needed. See your service-minded Continental Boiler representative or write for Bulletin BE-3.

BOILER ENGINEERING & SUPPLY COMPANY, INC.
8 Manavon Street, Phoenixville, Pa.

The Continental
AUTOMATIC
BOILER



Cut-away view of typical Series A Continental Automatic Boiler, firing oil and/or gas. Other models from 20 to 500 hp, with on-off, low-high-low or modulating controls. For steam heating or process work at pressures from 15 to 250 pounds, or for hot water heating at low or high temperatures.

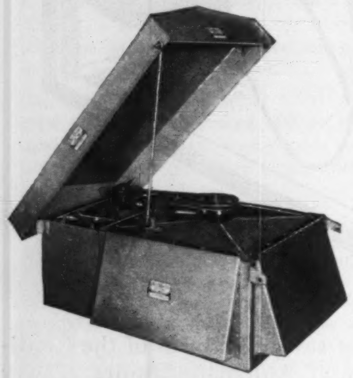
A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

AirMpeler

LO-BOY

CENTRIFUGAL ROOF EXHAUSTERS

Enhance the Beauty of Building Skylines



Pats.
Pend.

Lowest Silhouette Design

Forward or Backward Curve Wheel Within . . . . or Out of Scroll Housing

Motor mounting on side of structure support . . . out of line of air stream reduces height of Lo-Boy models nearly 50% of older designs.

LOW WIND RESISTANCE
SIZES 10"-72" 600-47,000
CERTIFIED C.F.M. RATINGS

- **QUALITY** ● **BEAUTY**
- **PROVEN PERFORMANCE**

See Sweet's File 20c/Amm or Write for bulletin HA-100 58

AMMERMAN CO., INC.

110 North Second St.
Minneapolis 1, Minnesota
MEMBER OF THE AIR MOVING & CONDITIONING ASSN.

RECENT TRADE LITERATURE

Continued

▶ *VALVES, DRIERS, STRAINERS*—Revised catalog No. 103 on valves, driers, strainers, accessories for refrigeration, air conditioning, industrial applications recently issued. New catalog details "Golden Bantam" packless line shutoff valves with extended ends and solder connections, "Cros-Vu Hermetic Seal" liquid indicators, new line of filter-driers. *Henry Valve Co., Dept. HPAC,* 3215 *North Ave., Melrose Park, Ill.*

▶ *VENT SILENCER* — Brochure describes new silencer designer to filter out sound from return air vents. Units said to prevent transmission of noise without impeding air passage. *Industrial Acoustics Co., Inc., Dept. HPAC,* 341 *Jackson Ave., New York* 54.

▶ *VENTILATING UNITS*—Bulletin No. UVS 104 covers manufacturer's line of "Util-A-Vents" in 12 basic sizes from 688 to 23,000 cfm. Units available as belt driven sets with choice of backward blade or forward curved wheels. Charts, specifications, diagrams included. *General Blower Co., Dept. HPAC, Morton Grove, Ill.*

▶ *VIBRATION CONTROL* — Bulletin K3B explains steel spring machinery mountings. Series of eight typical case histories with installation illustrations describe how mountings solved representative range of vibration, shock problems. Tables give capacities, characteristics of units including sizes, load capacities, dimensions, shipping weights. *Korfund Co., Inc., Dept. HPAC,* 48-15 32*nd Pl., Long Island City* 1, *N.Y.*

▶ *WATER TREATMENT* — New bulletin describes how proper water treatment reduces hard deposits, congestion; prevents corrosion from forming in wet type dust collectors. Six case histories presented. *North American Mogul Products Co., Dept. HPAC, Standard Bldg., Cleveland* 13.

HOW TO CUT APPLICATION COSTS

in Protecting Pipe and Pipe Joints Against Corrosion

Let

TAPECOAT®

do the job without Kettles, Hot Stuff, or Special Crews

When specifications call for hot applied coal tar protection of underground piping as in AWWA specifications C-203 and C-204, and the volume does not justify the cost of shipment to a mill for coating—TAPECOAT offers a practical solution. Here is a widely-accepted alternate material that is equivalent to mill-applied hot coal tar protection.

With this coal tar coating in handy tape form, piping contractors can use their own personnel to do the job because technical know-how and special equipment are not required. You save time and money and eliminate the need for sub-contracting in assuring the long-life protection called for.

TAPECOAT is easy to apply, using a torch to soften and bleed the pitch which provides both bond and protection. Available in widths of 2", 3", 4", 6", 18" and 24", it is spirally wrapped or cigarette wrapped around the vulnerable surfaces.

Since 1941, TAPECOAT has proved its ability to fight corrosion on pipe, pipe joints, mechanical couplings, conduit, cable and insulated piping.

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The TAPECOAT® Company

Originators of Coal Tar Coating in Tape Form

1555 Lyons Street
Evanston, Illinois

Chicago's Board of Trade Building uses ALLEN-BRADLEY CONTROL for its Air-Conditioning System

When your air-conditioning specifications read *"Motor Control by Allen-Bradley,"* you automatically assure yourself of many *years* of trouble free service. That's the reason why Allen-Bradley . . . the *quality* motor control . . . is specified for so many of today's larger and more important air-conditioning installations.

The simple solenoid design—which *only* Allen-Bradley has available in starters up through Size 7—uses only *one* moving part. There are no pins or bearings to stick and cause trouble . . . no flexible jumpers to wear and break. Also, the double break, silver alloy contacts—standard throughout the Allen-Bradley line—never need servicing of any kind. You can install Allen-Bradley motor control . . . and forget it!

Standardize on Allen-Bradley motor control—a decision you should make in your own interest. Its reliability—which is universally recognized—costs you no more. Send for A-B Handy Catalog, today.

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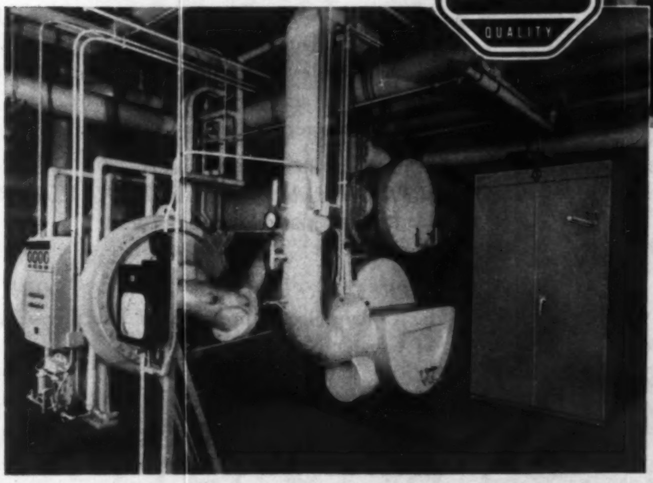
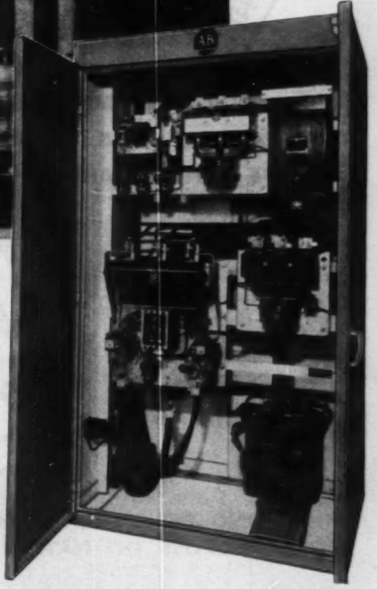
QUALITY
MOTOR CONTROL

Photo Courtesy of Hedrich-Blessing

A-B
QUALITY



This 400-ton Trane air-conditioning unit is the first of four to be installed. Each will have an A-B Bulletin 1277 starter to operate the 440 v compressor motor. *Consulting Engineers:* Brooke & Choporis. *Air-Conditioning Contractors:* Gallaher & Speck. *Elec. Contractors:* Henry Newgard & Co. *Managing Agents:* Hogan & Farwell.



A-B Bulletin 1277 autotransformer reduced voltage starter used on the Chicago Board of Trade job. It has closed circuit transition with current limiting acceleration, and uses an I.T.E. circuit breaker for disconnecting.

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FOR
HEATING – PLUMBING
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FORGET IT!!!

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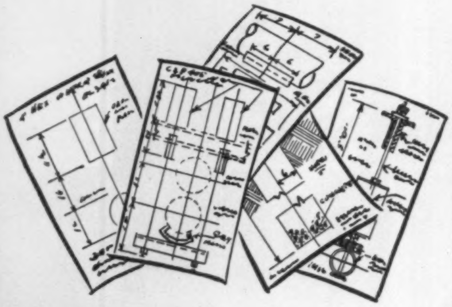
FOR 42 YEARS



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WHO'S WHAT...

(New personnel, promotions)

▶ *BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE CO.*—D. O. Thomas, chairman of board of directors; Willard B. Paine, president and chief executive officer.

▶ *AUSTIN CO.* — George A. Bryant, chairman and chief executive officer; Allan S. Austin, president; Harold A. Anderson, executive vice president and general manager; Harold A. Hallstein, vice chairman.

▶ *AIRTEMP DIV., CHRYSLER CORP.* — Paul W. Wyckoff, vice president in charge of engineering.

▶ *ANDERS-LYKENS CORP.* — William T. Griffiths, president; Edwin W. Anders, vice president; John J. Smith, secretary treasurer.

▶ *ROBERTSHAW-FULTON CONTROLS CO.* — A W. Beck, vice president of marketing.

▶ *FRIEZ INSTRUMENT DIV.* — Murray Kanes director of engineering.

▶ *AMERICAN STANDARDS ASSOCIATION* — Cyril Ainsworth, deputy managing director; J. W. McNair, technical director.

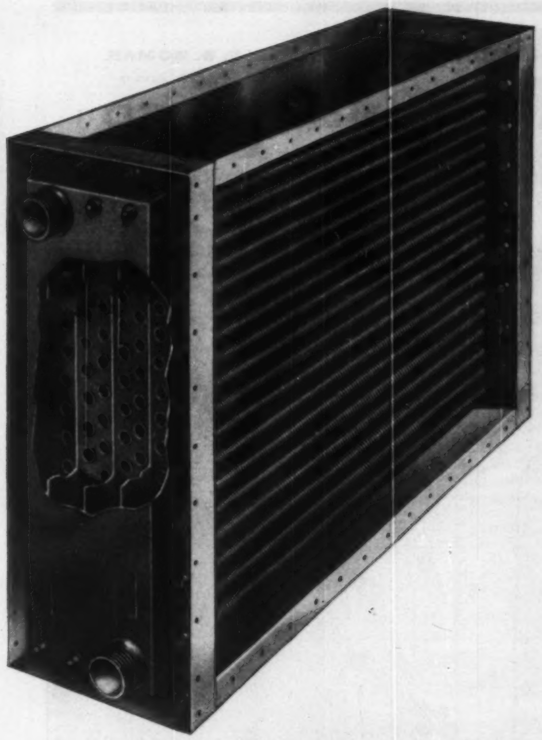
▶ *PHELPS DODGE COPPER PRODUCTS CORP.* — Edgar P. Dunlaevy, executive vice president; S. Allan Jacobs, president of Inca manufacturing division. They will also serve as directors. John J. Conlon, William K. Dunbar, Jr., Earle A. Mitchell, vice presidents; Charles F. Moody, works manager of Habirshaw cable and wire division; Lewis F. Buckman, works manager of Bayway division.

▶ *FRIGIDAIRE DIV., GENERAL MOTORS CORP.* — R. E. Gould, chief engineer.

▶ *PREFERRED UTILITIES MFG. CORP.* — Jack S. Kaplan, elected president of Executives' Association of Greater New York.

▶ *CORLETT & SPACKMAN* — Wendell R. Spackman, chairman of Building Industry Conference Board of San Francisco.

▶ *DRESSER MFG. DIV., DRESSER INDUSTRIES, INC.* — Milton H. Nelson, treasurer.



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• Complete Drainability
• Easily Cleaned
• High Heat Transfer

Completely drainable and easily cleaned, Aerofin Type "R" coils are specially designed for installations where frequent mechanical cleaning of the inside of the tubes is required.

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Write for Bulletin No. R-50.

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9. Madison School No. 6
10. St. Joseph Nurses Home
11. First National Bank, Thomas & Central Branch
12. Egyptian Motel
13. Sands Motel
14. Highway House Motel
15. Valley Ho Motel, Scottsdale
16. Down Town Motel
17. Motorola Research Lab.
18. Motorola Western Electronic Center
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The Burst-At-The-Seams activity that is today's Phoenix, Arizona, can best be measured by these diversified Drayer-Hanson air conditioning installations, recently sold by the E. B. Bomar organization, 914 W. Madison Street, Phoenix . . .

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WHO'S WHAT

Continued

▶ *DIAMOND DRILLING DIV. OF WHEEL TRUEING TOOL CO.* — A. F. Pickard, director of technical development.

▶ *WHEELABRATOR CORP.* — Otto A. Pfaff, chairman of the board; James F. Connaughton, president.

▶ *PLUMBING-HEATING-COOLING INFORMATION BUREAU* — Norman Wicks, executive director.

▶ *JOHNSON SERVICE CO.* — William P. Chapman, administrative director of research; Otto Scharpf, technical director of research and development.

▶ *MILTON ROY CO.* — Richard A. Bennett, chief mechanical research and development engineer; John P. Klembeth, product engineering manager.

▶ *METALS & CONTROLS CORP.* — John F. Wilson, vice president in charge of sales.

▶ *H. K. PORTER CO., INC.* — Fred W. Elliott, vice president.

▶ *EMBASSY STEEL PRODUCTS* — Sidney H. Zackin, vice president in charge of sales engineering.

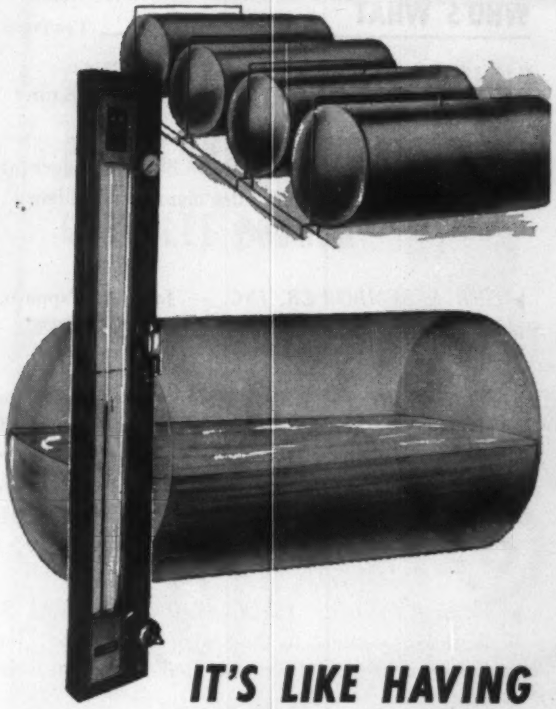
▶ *POWERS REGULATOR CO.* — Horace W. Fea, advertising director; Earl R. Bowman, advertising manager; Carl A. Gustafson, product manager for temperature control systems; James J. Atkinson, product manager for plumbing and heating products; Robert W. Clark, product manager for industrial process controls.

▶ *PRESSED STEEL TANK CO.* — H. E. Brumder, board member.

▶ *WOLVERINE TUBE, DIV. OF CALUMET & HECLA, INC.* — Ralph Seaton, technical sales supervisor.

▶ *AMERICAN-STANDARD PLUMBING AND HEATING DIV.* — George C. Cathcart, manager of Bayonne, N. J., heating plant.

▶ *RECOLD CORP.* — Sherman Singer, manager of air conditioning products.



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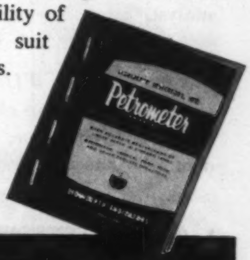
Complete information is available in our Bulletin 6400. Send today for your copy.



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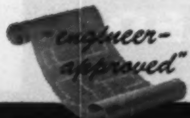

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VANE RUNNERS

THE EASIEST AND QUICKEST WAY EVER DEVISED

for installing single or double blade turning vanes in square elbows. No special tools required.

New production machinery of our own exclusive design, now enables us to produce button type Elgen All-Tite vane runners in continuous coils, effecting a savings in *your cost per job.*

COILED ELGEN ALL-TITE VANE RUNNERS MEANS . . .

- *Less Waste!* Waste pieces due to short ends are a thing of the past. Vane runner metal is coiled in 100 foot lengths, you just pull out the exact footage needed.
- *Easier Storage!* Each coil weighs approximately 50 lbs. and is packed in a box 28" x 28" x 5". Box fits easily under bench or against wall.
- *Easier Handling!* No loose pieces lying around to get in the way or collect dirt.
- *Unrolls absolutely flat!* Vane runner metal emerges from the box at bench height . . . absolutely flat . . . ready for use.

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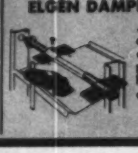
ELGEN SILENT DUCT

. . . for forming "flexible" duct connectors. A one piece metal to material unit, packed in coils, unrolls absolutely flat. Makes on the spot work a cinch.



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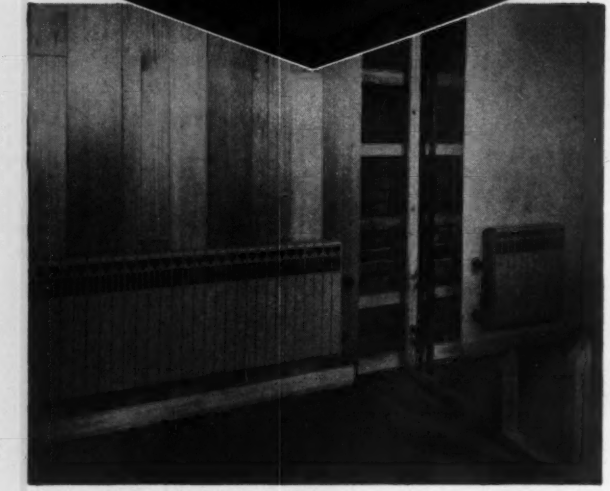
REDUCE
piping costs
. . . SPEED
installation

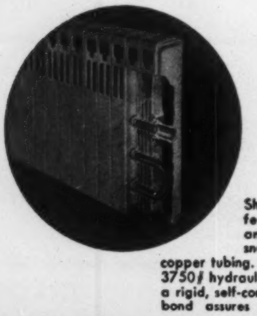


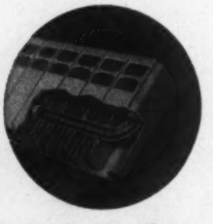
with
SHAW Radiators

Only Shaw, of all modern radiators, offers *same end* as well as opposite end tapping. Same end tapping has a place in almost every piping layout, and its use invariably means less piping materials, simplified pipe fitting.

Important savings in installation time are made with *any* Shaw model, regardless of tapping arrangement. Shaw units are compact, fully self-contained assemblies only 3" thick, easy to handle and mount. There are no dampers, or separate housings to fit and install.

Shaw Radiators distribute both radiant and convected heat in unvarying, health-guarding proportions that create natural thermal comfort in a room. They use either hot water or steam up to 150 psi. Write today for free literature on both panel and baseboard models.





Shaw Baseboard and Panel Radiators feature heavy gauge steel heating fins and box-type exterior radiant panels snugly fitted around the heavywall copper tubing. Tubing is then expanded slightly by 3750# hydraulic pressure to hold all components as a rigid, self-contained unit. The tight metal-to-metal bond assures rigidity and full heat conduction.

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MANUFACTURING COMPANY
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WHO'S WHAT

Continued

▶ *RHEEM MFG. CO.* — Thomas J. Ross, director.

▶ *McQUAY, INC.* — Willard B. Buck, manager of field sales; Alvin R. Flynn, sales manager; William P. Peterson, advertising manager.

▶ *ORR & SEMBOWER, INC.* — John A. Tapparo, plant manager.

▶ *YORK CORP.* — Wilbur S. Miller, sales development manager; Marvin M. Crout, service manager of engineered machinery; David H. Crawford, sales manager of commercial air conditioning; John L. Roth, manager of associate sales; Charles W. Egbert, manager of applications.

▶ *AMERICAN GAS ASSOCIATION* — Harold S. Walker, Jr., assistant to the managing director; Jac A. Cushman, corporate secretary and convention manager.

▶ *PITTSBURGH CORNING CORP.* — Robert L. Winter, new products analyst.

▶ *FLICK-REEDY CORP.* — James Schaeffer, assistant to production manager of Miller fluid power division.

▶ *FARR CO.* — Gordon F. Thruelsen, general sales manager.

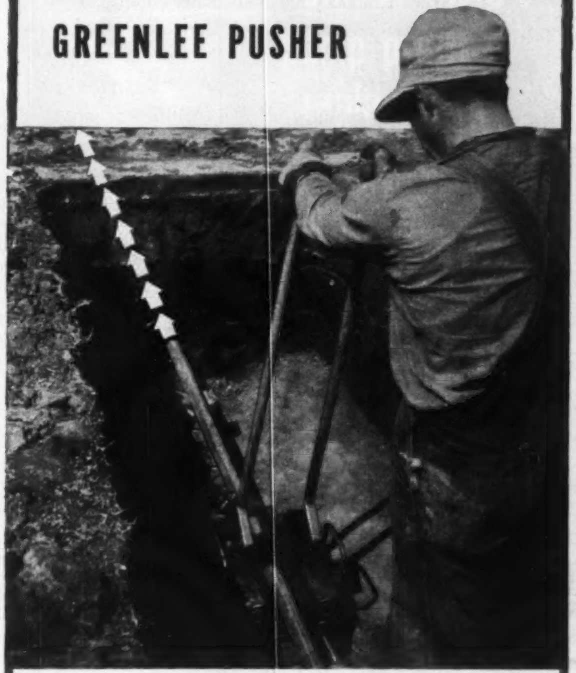
▶ *FLEXIBLE TUBING CORP.* — Wesley L. Guiles, manager of research, development and test center.

▶ *KEASBEY & MATTISON CO.* — Stuart I. Harris, technical sales assistant serving industrial products division; Edward Reddington, Jr., cost and inventory analyst.

▶ *BABCOCK & WILCOX CO.*—William J. Thomas and J. Roy Gordon elected to board of directors. Edward A. Livingstone, former director and vice president who has resigned, serves as consultant.

▶ *BUENSOD-STACEY, INC.*—Mrs. Alfred C. Buensod, chairman of board to succeed her late husband. Two new directors are Walter O. Hoffman, vice president in charge of specification sales; Joseph E. McDonald, executive assistant in charge of purchasing and personnel.

CUT COSTS ON UNDERGROUND PIPING INSTALLATIONS WITH GREENLEE PUSHER



Save hours of time, cut job costs with this quick, easy way of installing underground pipe. With a GREENLEE Hydraulic Pipe Pusher, *one man* pushes pipe *under* streets, walks, tracks, lawns, floors, and other obstacles. No costly tearing up of paving . . . eliminates extensive ditching, as just a short trench accommodates the Pusher. No tedious tunneling, backfilling, tamping, repaving. Compact, portable, powerful. Often pays for itself on first few jobs. Thousands in use for big savings of time and labor. Two models: one for 3/4 to 4″ pipe, one for larger pipe, concrete sewer pipe, drainage ducts. Write for facts today.

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Greenlee timesaving tools for plumbing and heating work: Hydraulic Pipe Pushers • Hydraulic Pipe Benders • Tubing Benders • Pipe Bits Auger Bits • Spiral Screw Drivers • Chisels • And many more

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ON

- **Booster Service**
- **Cooling Towers**
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Capacities, pressures and sizes for any requirement. Single-stage or multistage.

Unsurpassed for low-cost maintenance and high, sustained efficiency over wide range of conditions.

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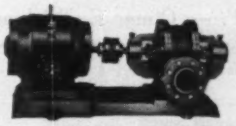

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Capacities to 200 gpm. Pressures to 900 ft. Sizes 1¼″ through 2½″. Horizontal, single-stage or multistage.

Develops high pressure at normal operating speeds. Handles widely varying heads with little change in capacity.

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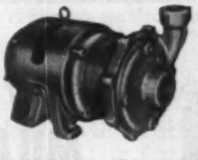

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Capacities to 900 gpm. Pressures to 525 ft. Sizes ¾″ through 5″. Single-stage or multi-stage.

General-purpose, close-coupled pump and motor units mount in any position—horizontal, vertical, angular.

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F-M Pomona Water-Lubricated Turbine Pumps

Capacities, pressures and sizes for any requirement.

Easily installed, easy to adjust for varying field conditions. Available with wide choice of drivers.

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- **Refrigeration**
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WHO'S WHAT

Continued

▸ *SUNDSTRAND HYDRAULIC DIV., SUNDSTRAND MACHINE TOOL CO.* — Ray J. Murphy, application engineer.

▸ *THOR POWER TOOL CO.* — Otto Schellenberger, Detroit district sales manager, named "manager of the year" by the company.

▸ *VENTILATING & AIR CONDITIONING CONTRACTORS ASSOCIATION OF CHICAGO* — Henry J. Couch, executive secretary.

▸ *VILTER MFG. CO.* — Whitney I. Grant, assistant chief engineer; Rolf Boehm, contracting coordinator.

▸ *BORG-WARNER CORP.* — Otmar E. Teichmann, associate director for engineering at company's center in Des Plaines, Ill.

▸ *BOHN ALUMINUM & BRASS CORP.* — Paul Disser, refrigeration division sales manager.

▸ *CONOFLOW CORP.* — Horace Keech, plant manager.

▸ *FEDDERS-QUIGAN CORP.* — A. F. Agovino, Fred Tiedeman, Silvester Thompson named manager, assistant manager, field service manager, respectively, all in service and customer relations department.

▸ *GIBSON REFRIGERATOR CO., DIV. OF HUPP CORP.* — Milo Chavez, national sales manager of room air conditioners and dehumidifiers.

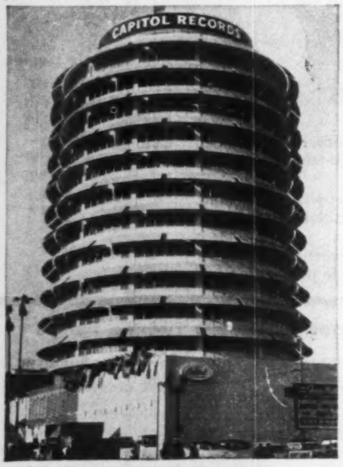
▸ *HUPPOWER DIV., HUPP CORP.* — J. Howard Stoops, general sales manager; E. A. Millheam, manufacturing manager; Robert L. Plasko, sales service manager of automotive heater products; E. F. Bernier, sales engineer.

▸ *HAYS CORP.* — Harlan Twible, vice president and manager of marketing.

▸ *JOHN WOOD CO.* — Charles E. Woollen, Jr., manager of special heater sales.

▸ *JACKSON & CHURCH DIV., YORK-SHIPLEY, INC.* — A. W. Pracker, sales manager.

▸ *A. M. BYERS CO.* — Daniel A. Torisky, advertising manager; Joseph Smith, assistant advertising manager.



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WELTON, BECKET & ASSOCIATES, ARCHITECTS-ENGINEERS, STATE PLUMBING & HEATING CO., MECHANICAL CONTRACTOR

Capitalize on

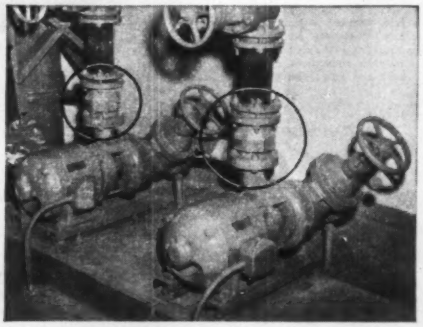
MILLER Streamflow CHECK VALVES

Completely Silences your piping system! CENTER-GUIDED, SHOCK PROOF, NOISELESS, ELIMINATES WATER HAMMER. FULL RADIAL FLOW.

SIZES 1" THROUGH 24".

FLANGED, ASA DRILLING, IBBM, CAST STEEL, ALL ALLOYS. FOR ALL FLUIDS AND GASES.

CERTIFIED MINIMUM PRESSURE DROP CURVE AVAILABLE



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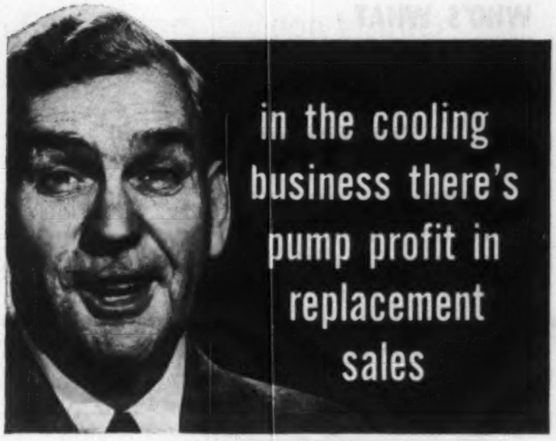
in the cooling business there's pump profit in replacement sales

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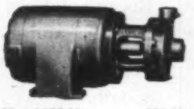
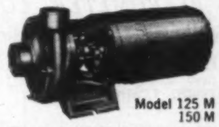
MYERS

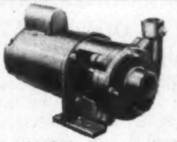
centri-thrift pumps

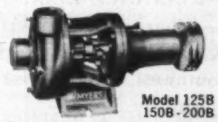
Ideal for all cooling-tower applications in air conditioning and refrigeration

Ruggedly built for continuous duty, the general duty Myers Centri-Thrift features an all bronze impeller, removable wearing ring, and stainless steel shaft. The line offers a full range of sizes: from 1" x 1¼" through 2" x 2½" and from ⅓ to 7½ horsepower. Capacities to 240 GPM, heads to 140 feet.


Model 150 M 200 M
Shown with rotary seal (available with stuffing box)

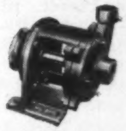

Model 125 M
150 M
Shown with stuffing box (available with rotary seal)


Model 100 M—Rotary seal only



Model 125B
150B - 200B
Shown with stuffing box (available with rotary seal)

Model 100B
Rotary Seal
only

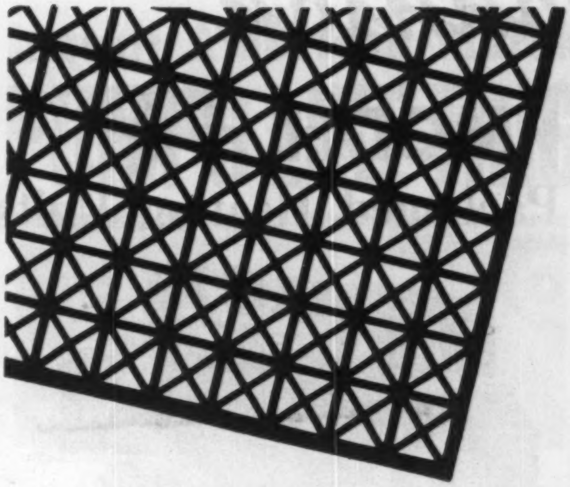


Write today for Catalog Section 210 covering the complete Myers Centri-Thrift line.

Myers® PUMPS

THE F. E. MYERS & BRO. CO.
9303 Orange St., Ashland, Ohio • Kitchener, Canada

Myers®



THEY'RE ELEGANT ...THEY'RE ECONOMICAL

Hendrick Architectural Grilles

When an architect draws up specifications for a new building or a modernization proposal he must adhere to two basic principles: FIRST, he must use his head in keeping costs down. SECOND, he must recommend functional materials and components that appeal to his client's decorative motif and sense of beauty.

That's why more and more architects specify Hendrick Grilles. Available in hundreds of attractive designs, Hendrick Grilles cost less to buy . . . cost less to install and cost less to maintain! And they provide more-than-ample area for free passage of air . . . always lie flat . . . don't bend or warp. For more information write to Hendrick, today.

HENDRICK

MANUFACTURING COMPANY

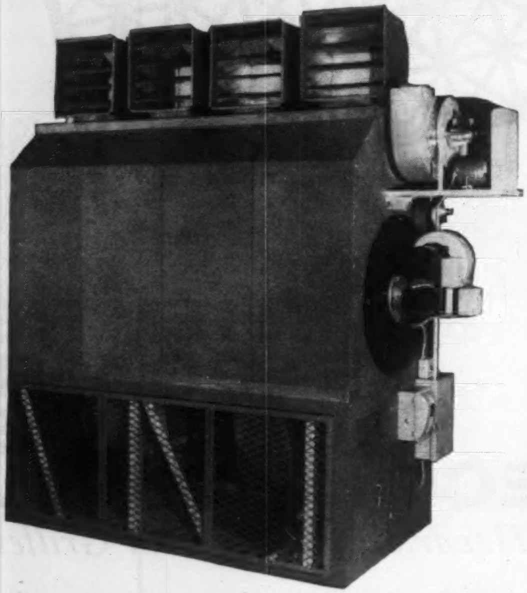
48 DUNDAFF STREET **CARBONDALE, PA.**

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Hendrick Wedge Wire Screens • Architectural Grilles Mitco Open Steel Flooring — Shur-Site Treads • Armorgrids Hydro Dehazers • Petrochemical Column Internals

#625

Johnson

▶ MODEL FA
Packaged Heating Units



▶ HEATING ▶ VENTILATING
▶ DRYING ▶ MAKE-UP AIR

DIRECT FIRED with
OIL, GAS or COMBINATION BURNER
FLOOR or SUSPENDED MODELS

SIZES FOR ALL COMMERCIAL & INDUSTRIAL APPLICATIONS • FOR USE WITH OR WITHOUT DUCTWORK

DESIGNED for
Low cost heating

JOHNSON MODEL "FA" Fyre-Tube HEATERS 400,000 to 3,000,000 BTU/hr output.

JOHNSON MODEL "JA" Aire-Tube HEATERS 110,000 to 5,000,000 BTU/hr output.

Write Today For Latest Catalogues And Engineering Data

Mail this coupon for information
Gentlemen:
We wish detailed information of Johnson Heaters as checked below.

Type Application you are considering
☐ SEND DATA ON COMPLETE LINE ....
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ADDRESS ....
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POSITION ....

JOHNSON HEATER CORP.
1 WINNISIMMET ST. CHELSEA 50, MASS.

WHO'S WHAT

Continued

IN THE TERRITORIES . . .

(Recent sales appointments)

▶ *MINNEAPOLIS-HONEYWELL REGULATOR CO.* — Martyn Kingsland, eastern regional commercial sales manager; Joseph Jester, northwest regional commercial sales manager in Minneapolis; Robert Patton, regional commercial sales manager for seven state mountain region, including Colorado, Utah, Wyoming, parts of New Mexico, Nevada, Montana, Idaho.

▶ *ORR & SEMBOWER, INC.* — New sales representatives are: Brose Co., northern California; Thermal Engineering & Equipment Co., southern California; M & T Distributing Co., Inc., Colorado; Blesi-Evans Co., Minnesota, North and South Dakota; L. W. Worthington, Montana.

▶ *RAMSET FASTENING SYSTEM* — Eight new district sales managers are: D. W. Champlin, New Castle County, Del., lower New Jersey, eastern Pennsylvania; R. H. Ernst, southern California; E. P. Gavin, Alabama, Arkansas, Louisiana, western Tennessee; A. G. Moore, Virginia, Maryland, Delaware, Washington, D.C.; F. A. Mullen, northern California; K. E. Van Scoy, Iowa, Kansas, Missouri, Nebraska, Oklahoma; R. E. Mullis, eastern Tennessee, North and South Carolina, Georgia, S. F. Nicholas, Jr., New York, Connecticut, Rhode Island.

▶ *PETROMETER CORP.* — Representatives are Stolley & Orlebeke, Ricks-Owen and Co., and Boston Draft Control Co. for Chicago, Houston, New England areas, respectively.

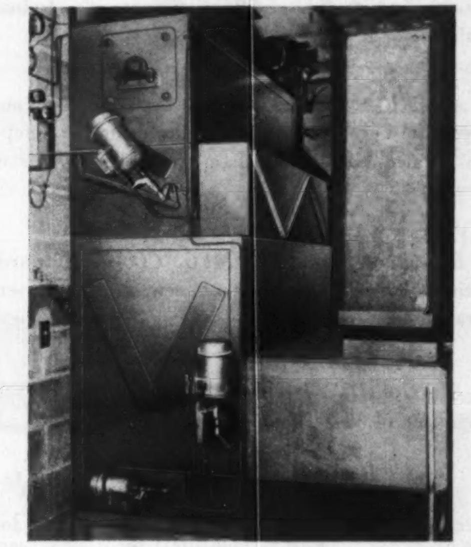
▶ *RELIANCE ELECTRIC AND ENGINEERING CO.* — Charles D. Herbert, Emory G. Orahood, William K. Schlotterbeck, R. O. Herbig, eastern, southeast, southwest, central-west regional sales managers, respectively.

▶ *CARRIER CORP.* — Dow-Pierce, Inc., distributor in Boston territory; Clark T. Shields, in charge of sales throughout Northeast.

▶ *DRESSER MFG. DIV., DRESSER INDUSTRIES, INC.* — William J. C. Marshall, Jr., and C. E. Boston, general markets sales representatives for New England states and for northern California, western Nevada, respectively.

Contractors . . . don't suffer from adverse building schedules

YOU CAN CHOOSE THE BEST TIME TO INSTALL HEATING AND VENTILATING WITH CARRIER "BUILDING BLOCK" DESIGN



Carrier "building block" design makes any installation simple and flexible. Fan and coil sections are compact factory-assembled units that easily fit through most doors and openings to the point of installation. By-pass, filter and mixing sections are simply bolted together on the job. This means that you no longer need rush equipment into place so that the building can be erected around it. You choose the time that suits you best for installation.

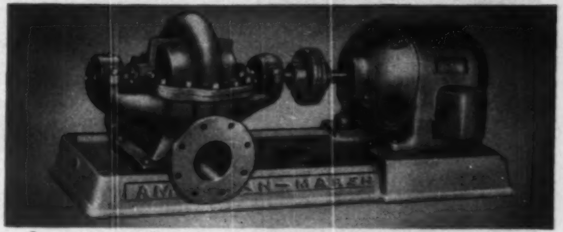
Carrier 46PQRV heating and ventilating units, with accessories, meet the requirements of any building. Available for steam and hot water systems in 6 basic sizes with 12 coil variations for each size, they deliver from 2000 to 30,000 cfm of conditioned air when used as a central heating source. They can be suspended vertically or horizontally from ceiling or wall, or mounted on the floor. They feature fan bearings, pulley and motor mounted outside fan casing to facilitate final adjustment and lubrication. And, for maximum efficiency in operation, automatic or manual controls can be provided to vary unit capacity.

Let your Carrier Unit Heater agent assist you in selecting the best arrangements for your next job. Since Carrier offers a complete range of steam, hot water and gas-fired unit heaters as well as Heat Diffusers-Direct Fired, his only concern is to recommend the best equipment for your needs. In principal cities, he is listed in the Classified Telephone Directory under "Heaters—Unit." Carrier Corporation, Syracuse, N. Y.

Carrier Air Conditioning • Refrigeration
Industrial Heating

Install American-Marsh

PUMPS LIKE THIS

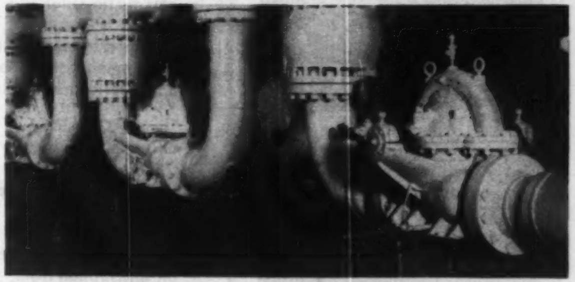


Conventional stuffing box or mechanical seals.

on vital heavy-duty

JOBS LIKE THIS

FOR PERMANENT SATISFACTION!



Above — Three bronze-fitted American-Marsh Centrifugals, with direct drive 150 HP motors, each circulate up to 2,000 GPM of chilled water in air conditioning system.

WHEN YOU SELECT or recommend an American-Marsh Pump, you know it's backed by 80 years' experience in building pumps — and pumps only!

WHEN YOU INSTALL it, you know it was individually factory tested to meet all specifications before shipment. (*Every* A-M pump is fully tested!)

IF YOU'D LIKE suggestions on the best type and size for *your* job, call your American-Marsh representative. He'll help make sure *your* pump gives permanent satisfaction!

WRITE FOR BULLETIN 350 for details of Model HLM above — or describe your application.

AMERICAN-MARSH PUMPS

BATTLE CREEK MICHIGAN

Pumps and Pumps only Since 1873

CENTRIFUGAL, TURBINE, STEAM AND POWER PUMPS FOR TESTING, PROCESSING, BOILER FEED, FIRE PROTECTION, ETC.

you can depend on
AGITAIR for better air

Custom Made

AIR DIFFUSERS with DIFFUSING VANES

Each AGITAIR square and rectangular air diffuser is custom designed to meet your requirements of air flow and interior treatment.

These AGITAIR diffusers have built-in diffusing vanes, scientifically arranged in unlimited louver patterns to provide certified 100% draftless air distribution from any ceiling or wall location.

AGITAIR Catalog R-107 shows you how to select the proper size and pattern for your job conditions.

Write for your copy today.

AIR DEVICES INC.
185 MADISON AVE., N. Y. 16, N. Y.
air diffusers • filters • exhausters

WHO'S WHAT

Continued

▶ *AUTOMATIC SWITCH CO.* — Ju-No Supply Co., stocking distributor of "Asco" solenoid valves for Clearwater, Fla., area. Office of J. R. Ruddock & Associates, Chicago representative, moved to 4822 N. Damen Ave.

▶ *ALLIS-CHALMERS MFG. CO.* — New distributors are Drillmaster Supply and Mfg. Co., Inc., for Evansville, Ind., area; Turner Electric Works, for Jacksonville, Fla., territory; Bernie Spencer's Industrial Sales and Service, for Fallon, Nev., area.

▶ *AMERICAN AIR FILTER CO., INC.* — Ivan W. Dyer, former development engineer for the company, has joined Earl W. Graham Co. as field sales engineer.

▶ *BLACK & DECKER MFG. CO.* — Edward G. Seiders, service manager at new sales and service branch in Tampa, Fla.

▶ *BORG-WARNER CORP.* — Charles S. Wiggins, manager of Washington, D. C., office.

▶ *BABCOCK & WILCOX CO.* — William W. Gilbert, manager of Detroit district sales office; Joseph E. Kossan, service engineer for Pittsburgh district. Office of A. M. Lockett & Co., Ltd., sales engineering representative of boiler division, moved to 1701 Mercantile Dallas Bldg., Dallas.

▶ *COCHRANE ENGINEERING CO.* — James T. Stanton, sales staff in Chicago area.

▶ *DRAVO CORP.* — General Equipment Sales, Inc., distributor for six Texas, 12 New Mexico counties.

▶ *DUNHAM-BUSH, INC.* — Larry A. Donnenwirth, sales engineer at Sacramento, Calif.

▶ *DeZURIC SALES CO.* — Charles Hodgdon, in charge of Summit, N. J., office.

▶ *GOLDEN-ANDERSON VALVE SPECIALTY CO.* — Gil Moore & Co. and Dorner Co., new agents in Boston, Milwaukee areas, respectively.

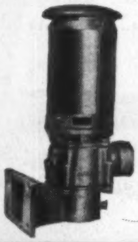
▶ *DEMING CO.* — Larry Griehs, district representative for parts of Indiana, Ohio, Kentucky.

Meet Your JOB REQUIREMENTS *"RIGHT* ON THE NOSE" *with the NEW!*

TYPE BJ END SUCTION

AURORA®
General Purpose
CLOSE-COUPLED CENTRIFUGAL PUMPS

Getting acquainted with Aurora's General Purpose Pumps is like finding buried treasure. This new line with LOW NPSH characteristics is heavily value-packed with quality features that assure brilliant, many year performance.


TYPE BJF FLANGE MOUNTED

IDEAL *for* THESE DUTIES
AIR CONDITIONING
REFRIGERATION
COOLANT
HOT WATER
CHEMICAL*
GENERAL PURPOSE

*MAY BE FURNISHED IN SPECIAL ALLOYS TO MEET SPECIFIC CONDITIONS

A FEW OF MANY VALUE FEATURES
SEALS or GLANDS — Available in either as desired.
SPEEDS — 3,500, 1,750 (60 cycle) and 2,880, 1,440 (50 cycle) speeds.
CURRENT — AC or DC — All voltages and phases.
MOTORS — 1/6 to 7½ H.P. drip-proof, splash-proof, totally enclosed, explosion-proof and chemical. Quiet, efficient NEMA standard.
COMPACT — QUIET — ECONOMICAL.

Write for BULLETIN 119 for complete description of AURORA Quality construction and design details.

TYPE BJV BASE MOUNTED

TYPE BJH HORIZONTAL

PUMPS
"by Aurora"
for EVERY NEED in INDUSTRY
for
WATER SUPPLY
CONDENSATE
BOILER FEED
PROCESSING
BOOSTER
TRANSFER
ETC., ETC.
Ask for CONDENSED CATALOG "M"

CONSULT with US

Aurora engineers will appreciate specifications of your difficult jobs. Only the RIGHT Pump does the job RIGHT.

Your Inquiries Will Receive Prompt Attention

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA PUMP DIVISION
THE NEW YORK AIR BRAKE COMPANY
80 LOUCKS STREET • AURORA • ILLINOIS
EXPORT DEPARTMENT — Aurora, Illinois — Cable Address "NYABINT"

A NEW more reliable air conditioning method

with exact moisture control
FOR
YOUR PROCESS OR PROTECTION
FOR
TESTING PRODUCTS OR MATERIALS
AT ANY TIME OF THE YEAR

Assembling Electronic Parts

Packaging Food Products

Drying Industrial Material

● This Niagara "Controlled Humidity" method gives you the **MOST EFFECTIVE** Air Conditioning because its cooling and heating functions are made completely separate from adding or taking away moisture. This assures you always a precise result. No moisture sensitive instruments are needed.

MOST FLEXIBLE. You can reach and hold any condition in response to instrument settings, or vary it as you wish.

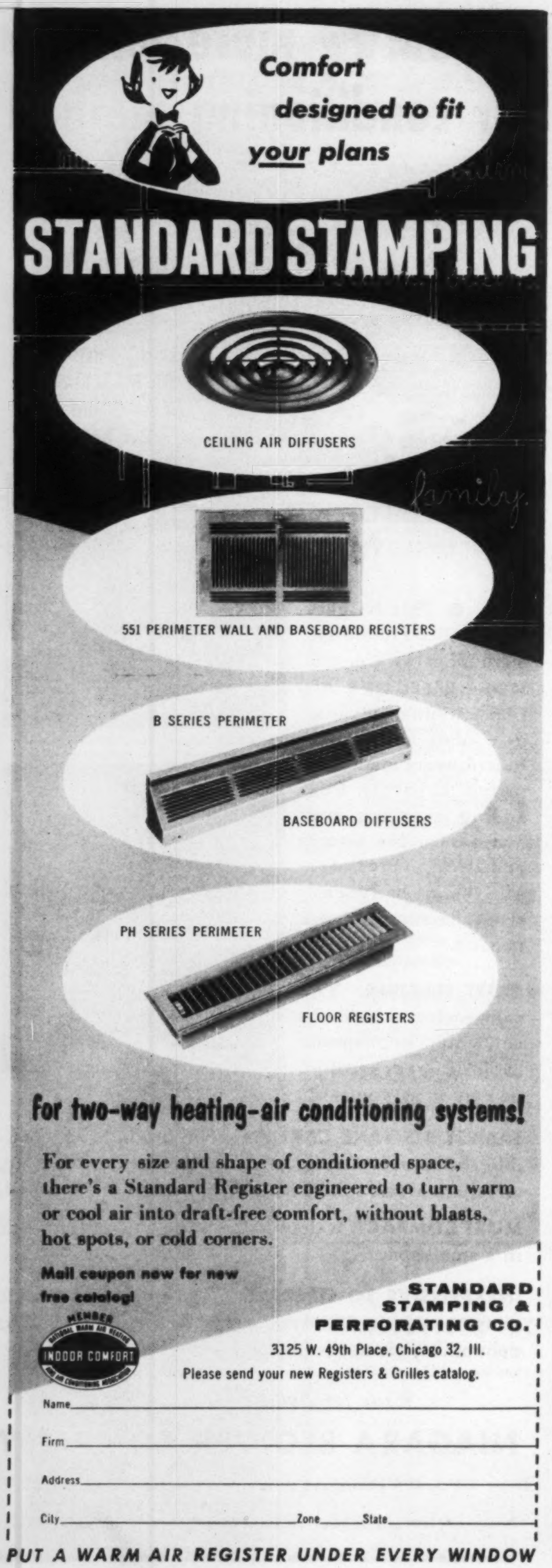
EASIEST TO TAKE CARE OF. The machine is accessible, the control circuits are simple and easy to operate, and there are no solids, salts or solutions to be handled.

MOST COMPACT. It does a very large amount of work in a small space.

INEXPENSIVE TO OPERATE. At normal atmospheric temperatures (unlike systems that use refrigeration to dehumidify) it needs no summer re-heat.

Write for Bulletins 112 and 122

NIAGARA BLOWER COMPANY
Dept. HP-3, 405 Lexington Ave. New York 17, N. Y.
Niagara District Engineers in Principal Cities of U. S. and Canada


Comfort designed to fit your plans
STANDARD STAMPING
CEILING AIR DIFFUSERS
551 PERIMETER WALL AND BASEBOARD REGISTERS
B SERIES PERIMETER
BASEBOARD DIFFUSERS
PH SERIES PERIMETER
FLOOR REGISTERS
for two-way heating-air conditioning systems!
INDOOR COMFORT

For every size and shape of conditioned space, there's a Standard Register engineered to turn warm or cool air into draft-free comfort, without blasts, hot spots, or cold corners.

Mail coupon now for new free catalog!

STANDARD STAMPING & PERFORATING CO.
3125 W. 49th Place, Chicago 32, Ill.
Please send your new Registers & Grilles catalog.

Name
Firm
Address
City Zone State

PUT A WARM AIR REGISTER UNDER EVERY WINDOW

WHO'S WHAT

Continued

▶ *TRANE CO.* — Authorized sources of package air conditioning equipment are: Apex Air Conditioning Corp., Cooling Enterprises, Inc., Heights Electric and Engineering, Wyant Engineering Service Co., Conditioning Service Corp., all for New York City; Dauer Refrigeration Co., Boston; Midway Heating and Air Conditioning Co., Inc., Marietta, Ga.; Parker Heating and Air Conditioning Co., Atlanta; Hall Sheet Metal Co., Claremore, Okla.; Scranton Electric Construction Co., Inc., Scranton, Pa.; Roger Hamilton and William Ames, sales engineers for Cincinnati and Syracuse sales offices, respectively.

▶ *U. S. GAUGE DIV., AMERICAN MACHINE AND METALS, INC.* — Robert V. Dallis, manager of Atlanta office. Met-Trick Control Co., stocking distributor for Charlotte, N. C., area.

▶ *JACKSON & CHURCH DIV., YORK-SHIPLEY, INC.* — Karl Koons, sales representative for Ohio, western New York, western Pennsylvania, West Virginia territory.

▶ *PEERLESS MFG. CO.* — W. J. Villarreal Co., representative for California, Nevada, Hawaii territory.

▶ *DURA-VENT CORP.* — W. J. Villareal Co., representative for California, Nevada, Hawaii areas.

▶ *J. F. PRITCHARD & CO.* — Kenneth G. Holdom, manager of eastern district.

▶ *QUAKER RUBBER DIV.* — Harbor Steel & Supply Corp., distributor in western Michigan.

▶ *REMINGTON AIR CONDITIONING DIV.* — R. P. Greiner, sales representative for eastern Missouri, southern Illinois.

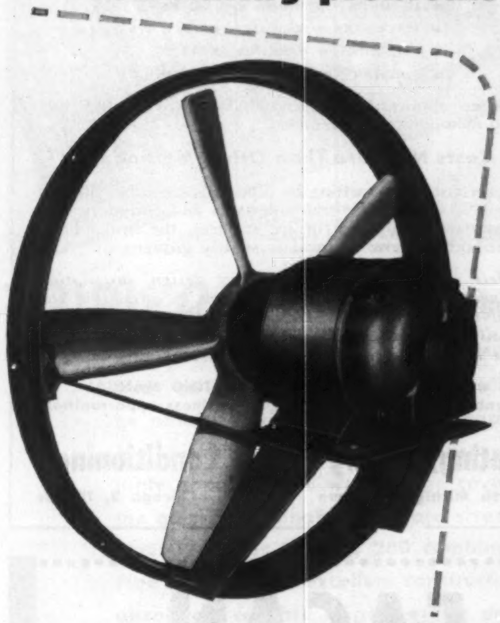
▶ *YORK CORP.* — New managers are Fred C. Wood, E. John Berlet, Jr., Winston W. Salmond, Charles P. Strickland, Jr., Theodore Y. Davis, and Christian J. Schurman for central, north Atlantic, southern, southwest, middle Atlantic, Pacific districts, respectively.

▶ *TUBE MANIFOLD CORP.* — W. O. Johnson, factory representative for Los Angeles area.

▶ *ROBINSON CLAY PRODUCT CO.* — Edward B. Mogenhan, Rochester, N. Y., branch resident manager.

PROPELLAIR

...built to solve your "heavy duty" ventilating problems



...mount in any position

Heavy duty Propellair Type "CD" fans are designed for versatility and rugged duty. They can be mounted in side walls, roof ventilators, hoods, ducts and machinery in any position you require. They are ideal for "tough" ventilating jobs like removing heat, moisture, smoke and dust laden air. You get greater efficiency and quieter operation, because the exclusive venturi entrance ring prevents wasteful recirculation. The rigid, cast aluminum, precision balanced air-foil propeller runs quieter and retains its clean aerodynamic characteristics at all operating pressures. Powered by dependable Robbins & Myers Motors of any design you need, they are covered by a single name-plate guarantee. Available in sizes from 12" to 60" for from 1020 to 85000 CFM air delivery. Let Propellair engineers survey your needs and recommend the correct ventilating equipment.

WRITE FOR BULLETIN NO. 690 HP

R&M **PROPELLAIR**®

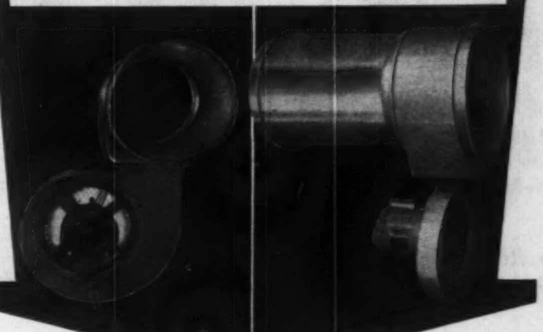
DIV. OF ROBBINS AND MYERS, INC.
SPRINGFIELD, OHIO

Certified Ratings
PFMA

MAN COOLER
SKY-BLAST
VANEAXIAL
TUBEAXIAL
EXTENDED SHAFT

MOVING AIR IS OUR BUSINESS

FOR LOW COST HEATING PLANT POWER-DRAFT AND INDUSTRIAL EXHAUSTING



...Specify

Quickdraft

★ NO MOTORS, FANS OR BEARINGS IN EXHAUST LINE ★ NEEDS NO STACKS ★ ACID RESISTING FINISHES ★ STATIC PRESSURE UP TO 12 INCHES

FOR HEATING PLANTS AND INCINERATORS, Quickdraft provides constant draft for efficient and economical combustion. It eliminates pulsating or chattering, puffing, smoking and sooting. Costly, tall and unsightly stacks are unnecessary.

FOR INDUSTRY, Quickdraft offers up to 12 inches static pressure for exhausting corrosive gases, abrasives and paint spray . . . moving fine bulk materials and wastes.

FOR MOVING AIR . . . in or out of building through ducts . . . Quickdraft is outstanding.

N-588-QD

IMPORTANT NOTICE

For withstanding corrosive gases, all Quickdraft units are available in standard acid resisting vitreous enamel, No. 316 Stainless Steel, rigid plastics (P.V.C.) and with plastic and Fiberglas coatings.

Write for QUICKDRAFT ENGINEERING DATA on your application . . . today.

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Engineering
Data

Quickdraft CORPORATION

P. O. Box 87-K
Dueber-Hampden
Bldg.
Canton 1, Ohio

WHO'S WHAT

Continued

▸ *JOHNSON SERVICE CO.* — Joseph A. Cutler, Jr., sales engineer at New York City sales office.

▸ *KELLEY ASSOCIATES, INC.* — Albert E. Rabe, sales director and vice president.

▸ *KEROTEST MFG. CO.* — Roy B. McCrady, manufacturer's representative for Missouri, Kansas, Iowa, Nebraska territory.

▸ *RUUD MFG. CO.* — Columbia Pipe & Supply Co., distributor for Chicago, 10 northern Illinois counties.

▸ *DUNHAM-BUSH, INC.* — Lee Babin, export manager at New England District Sales office, West Hartford, Conn.

▸ *THOR POWER TOOL CO.* — Seven new district sales managers are: Walter B. Smith, Milwaukee; Theodore E. Vocker, St. Louis; Harry L. Groves, Houston; Martin A. Bertram, Cincinnati; Samuel P. Gartland, Boston; Thomas J. Murphy, Buffalo; James Q. Golden, Atlanta.

NOW is the time to consider

SNOW MELTING

Systems around Buildings and Grounds

Better send at once for our SNOW MELTING MANUAL. Here are design data based on a study of—and others' actual experience with over 100 snow melting systems of all kinds for

- **LOADING PLATFORMS and DOCKS**
- **SIDEWALKS • ROADS • DRIVEWAYS**
- **MARQUEES • PARKING AREAS**
- **RUNWAYS • RAILWAY SWITCHES**

and other applications which HAVE proved that this modern method of snow removal.

Costs No More Than Other Methods

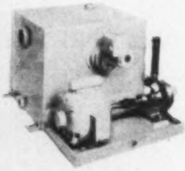
—and because snow melting by pipe coils has other distinct advantages, such as dirt-free sidewalks and entrances, and the complete elimination of ice surfaces, the demand for this method of snow removal is swiftly growing.

Complete information on the correct design, installation and operation of snow melting systems is offered in the new SNOW MELTING MANUAL, a reprint of articles originally published in HEATING, PIPING & AIR CONDITIONING. Fifty cents per copy.

$0.50 will bring you this SNOW MELTING MANUAL . . . a valuable addition to your file on business opportunities.

Heating, Piping & Air Conditioning

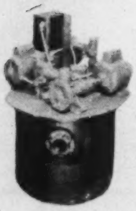
6 North Michigan Avenue **Chicago 2, Illinois**



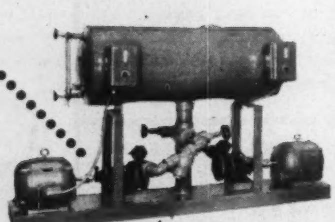
EAGAN EAGLE

—For steam heating loads up to 8000 sq. ft. at 20 p.s.i. Does not require pit even though return lines are no more than one foot above the floor.

EAGAN HOT POT —Vertical submerged type pump with cast iron receiver. Motor and pump above receiver safe from flooding. Single and duplex construction. Models for loads up to 15,000 sq. ft. at 20 p.s.i.



TYPE ECIV —Vertical pump and receiver for installations where return lines are below floor levels. Single or duplex units. Models up to 10,000 sq. ft. capacity at 60 p.s.i.



TYPE EC

—Straight line arrangement requiring less floor space than necessary for competitive makes. Both pumps accessible for maintenance purposes. Single and duplex models designed for 2000 to 100,000 sq. ft. discharging against pressures of from 10 to 200 p.s.i.

EAGAN...

the complete line of Condensate Return Pumps

Eagan offers a full line of Condensate Return Pumps, and also manufactures Fuel Oil Pump and Heater Sets, Proportioning Pumps, Turbine Pumps and Centrifugal Pumps.

WALTER H. EAGAN CO., INC.

Pump Specialists Since 1920

2336 Fairmount Ave., Dept. HPAC, Phila. 30, Pa.

Gentlemen:

Send me complete information on the EAGAN Line of Condensate Pumps.

COMPANY ....

NAME ....

ADDRESS ....

CITY .... **ZONE** .. **STATE** ....

Rapidly becoming FAVORITES with installers everywhere!

No. 92 VHV TRIPL-AIRE MULTI-DEFLECTION REGISTER. Vertical face bars, horizontal secondary bars. Vertical Louvers. Without valve—92VHO GRILLE.

H&C

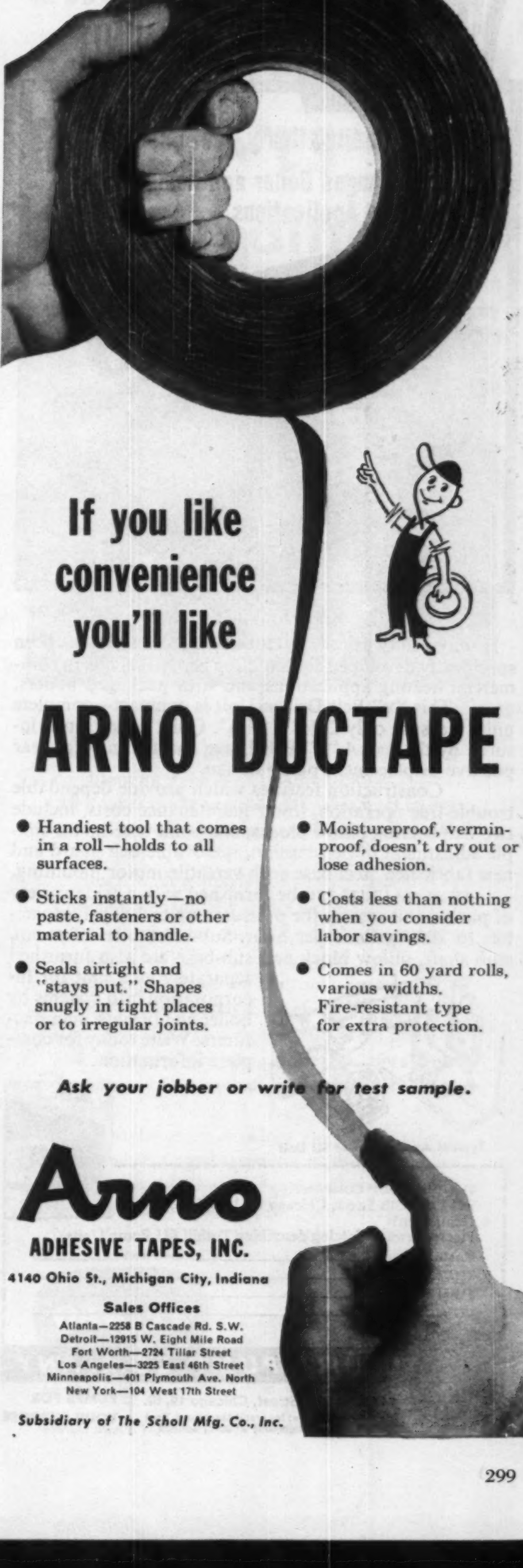
TRIPL-AIRE® REGISTERS & GRILLES

The ease with which any desired airflow, both directionally and volumetrically, can be obtained with these registers and grilles is one reason they have become exceedingly popular. The wide range covered by the quickly obtainable standard sizes is another (26 sizes offering 260 combinations.) Fine appearance, excellent construction and absolutely reliable engineering data are other elements that are making this H&C line first choice of a host of Air Conditioning dealers for all their commercial installations.

HART & COOLEY
MANUFACTURING CO.
508 E. EIGHTH ST. HOLLAND, MICH.
In Canada — Fort Erie, Ontario.

WORLD'S LARGEST PRODUCERS OF REGISTERS and GRILLES

No. 94A FIXT-AIRE® GRILLE . . . horizontal face bars set at 22° angle for up or down deflection.



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- Handiest tool that comes in a roll—holds to all surfaces.
- Sticks instantly—no paste, fasteners or other material to handle.
- Seals airtight and "stays put." Shapes snugly in tight places or to irregular joints.
- Moistureproof, vermin-proof, doesn't dry out or lose adhesion.
- Costs less than nothing when you consider labor savings.
- Comes in 60 yard rolls, various widths. Fire-resistant type for extra protection.

Ask your jobber or write for test sample.

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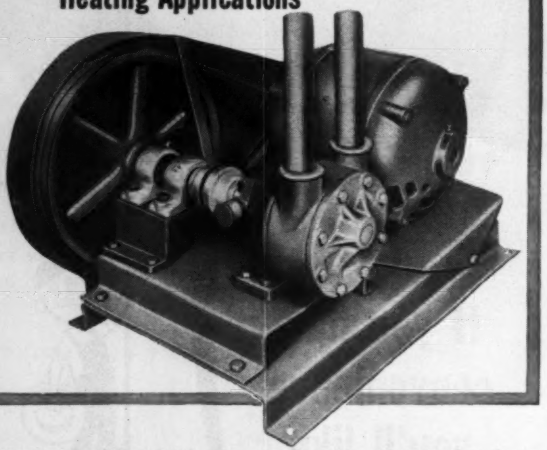
Detroit—12915 W. Eight Mile Road
Fort Worth—2724 Tillar Street
Los Angeles—3225 East 46th Street
Minneapolis—401 Plymouth Ave. North
New York—104 West 17th Street

Subsidiary of The Scholl Mfg. Co., Inc.

new

TUTHILL
SU
PUMP UNIT

- For Handling Heavy Fuel Oils
- In Packaged Boiler and Commercial Heating Applications

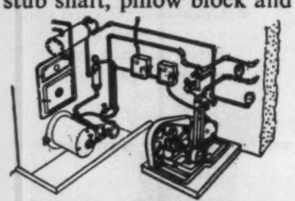


Economically priced, TUTHILL'S SU PUMP UNIT has been specifically developed for handling heavy fuel oils in commercial heating applications and with packaged boilers.

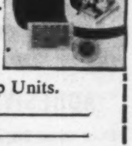
This "v" Belt Driven Unit is compact—complete units measure only 24¼″ x 14⅝″. Quiet operation is insured by the 2 or 4 "v" Belt Drive and the integral gear positive displacement pump design.

Construction features which provide dependable trouble-free operation, lower maintenance costs, include two ball bearing pillow blocks, one point take-up for simple adjustment of belt tension, removable belt guard and new fabricated steel base with versatile motor mounting.

SU PUMP UNITS can be furnished with a wide variety of pumps and motors for pressures up to 300 psi, capacities to 2030 gallons per hour. Sub-assemblies of pump, stub shaft, pillow block and sub-base are also furnished separately as a unit for incorporation into systems by boiler and furnace manufacturers. Write today for complete information.



Typical Application of SU Unit



TUTHILL PUMP COMPANY
947 East 95th Street, Chicago 19, Illinois
Gentlemen:
Please forward Catalog describing Tuthill SU Pump Units.
NAME__________ COMPANY__________
TITLE__________
STREET__________
CITY__________ STATE__________

TUTHILL PUMP COMPANY
947 East 95th Street, Chicago 19, Ill.
Canadian Affiliate: Ingersoll Machine & Tool Company, Ltd., Ingersoll, Ontario, Canada

PUMPS FOR
YOUR PURPOSE

WE HEAR THAT . . .

▶ *JOSEPH T. RYERSON & SON, INC.* is erecting a 36,000 sq ft warehouse building in St. Louis. When construction is completed, the company will have additional space totalling 67,200 sq ft. New facilities are expected to be in operation this spring.

▶ *SCATENA YORK CO.* has constructed a warehouse with offices in San Francisco which provides 12,000 sq ft of floor space.

▶ A 6 ton electrodynamic balancing machine is being put into operation by *UTILITY FAN CORP.* in the production of air conditioning and ventilating equipment.

▶ *UNION TANK CAR CO.* has announced that *GRAVER WATER CONDITIONING CO.* has become a completely integrated and wholly owned division of the firm.

▶ *WHITE-RODGERS, LTD.* has opened a new factory at Markham, Ontario. The plant contains more than 18,000 sq ft of space and is located on a 37 acre site.

▶ About 40 heating and air conditioning engineer alumni of the University of Illinois attended the Illini dinner during the January meeting of the *AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS.*

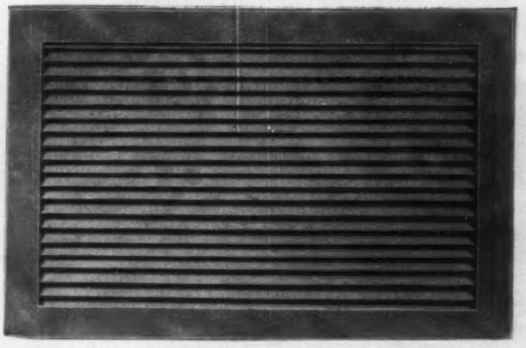
▶ *LIMBACH CO.* has acquired the *B. A. WALTERMAN CO.* The latter firm is one of the largest heating, piping, and air conditioning contractors in Cincinnati.

▶ Changes in the organizational structure of *NATIONAL CYLINDER GAS CO.* include the formation of a separate division to design and construct processing plants for the chemical, petroleum, and other industries. Other new divisions are *NCG DIV.*, *GIRDLER PROCESS EQUIPMENT DIV.*, and the *CHEMICAL PRODUCTS DIV.*

▶ A new *JOINT INDUSTRY PROGRAM COMMITTEE* composed of officials of the *NATIONAL ASSOCIATION OF PLUMBING CONTRACTORS*, the *MECHANICAL CONTRACTORS ASSOCIATION OF AMERICA*, and the *UNITED ASSOCIATION OF PLUMBERS AND PIPEFITTERS* has been formed for the mechanical contracting and plumbing industries. The chairmanship of the organization will rotate among the groups annually. *JOSEPH H. SPITZLEY*, president of MCAA, was elected as the first chairman.

MAXIMUM PERFORMANCE

Minimum See-through



No. 42-H Grille Depth 13/16"

A-J NO. 42 SERIES RETURN AIR REGISTERS and GRILLES

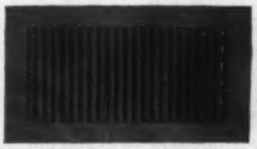
ATTRACTIVE, STURDY, EFFICIENT. That's the kind of return air grilles and registers you get when you specify the A-J No. 42 Series. Face bars on ½" centers with 45° deflection provide unhampered air flow and aid privacy by minimizing unsightly see-through. Both horizontal and vertical styles are available.

Rims are ⅞" beyond duct size on all sides. Screw holes are countersunk. No. 432 and No. 442 styles come with gasket. Standard finish is gray prime.

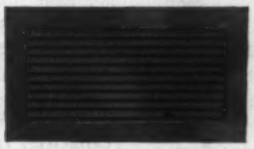
The No. 432 has multiple register body. Lever operator is removable. No. 442 opposed blade damper is adjustable through face with No. 2 or No. 3 Phillips Screw Driver.

Grilles and register faces can be special ordered in aluminum.

For full information, send for free catalog.



No. 432-V Register



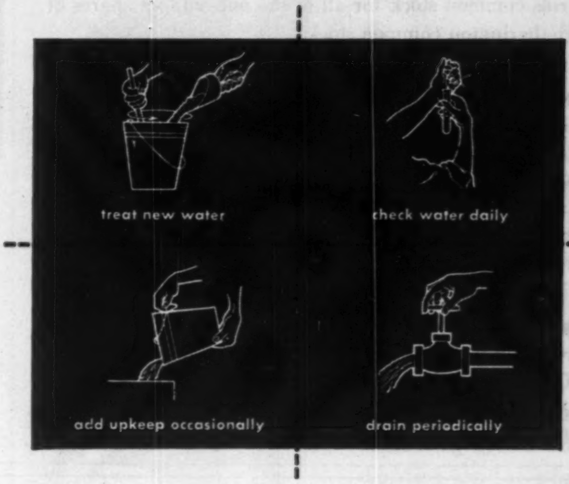
No. 442-H Register

A-J

A-J MANUFACTURING CO.

3601 E. 18th St. Dept. H-3 Kansas City 27, Mo.

SIMPLE—4-step water treatment IMPROVES Air Conditioning



End scale, slime and corrosion troubles in air conditioning water with Oakite Airefiner No. 52. All it takes is a ten-minute daily check up by one man. This way you maintain high cooling efficiency and you reduce out-of-service time, too.

How? With a simple four step program. (1) Charge water initially with Oakite Airefiner No. 52. (2) Test water daily. (3) Add upkeep when necessary. (4) Drain system and replace with new, charged water on a periodic basis.

That's all there is to it. Airefiner No. 52 checks slime and algae growth, prevents scale build-up and minimizes corrosion. It leaves tubes clean for efficient heat exchange. It's safe. It's inexpensive.

For explanatory drawings and full details on this time and trouble saving method, ask your local Oakite Technical Service Representative, or write Oakite Products, Inc., 51A Rector Street, New York 6, N. Y.

OAKITE

In our 50th year

specialized
WATER TREATING
materials

Technical Service Representatives in Principal Cities of U. S. and Canada

WE HEAR THAT

Continued

▶ Open house was held in *CARRIER CORP.'s* new district office building located in Houston. The company has also announced a new service contract for dealers and distributors covering maintenance, inspection, and labor service.

▶ *CONTROLS CO. OF AMERICA* has entered into a contract for the acquisition of *HETHERINGTON, INC.* through an exchange of 65,000 shares of Controls common stock for all of the outstanding shares of Hetherington common stock.

▶ A group of painting contractors, paint chemists, and application technicians have organized to form the *CORROSION PROTECTION SERVICES CO., INC.* with offices in New York City. Prime purpose of the group is to provide qualified personnel experienced in the technical aspects of the application of heavy duty coatings.

▶ *HUBBARD, LAWLESS & BLAKELEY, CONSULTING ENGINEERS* with offices in New Haven, Conn., and Boston, announced the advancement of *RICHARD E. JUDD* and *STANLEY R. OSBORNE* from senior engineers to partnership.

▶ *HARVEY MACHINE CO., INC.* has changed its corporate name to *HARVEY ALUMINUM.*

▶ *HOLMES & NARVER, INC.* is observing its 25th anniversary this year.

▶ *INDUSTRIAL COMBUSTION, INC.* has acquired facilities of the former burner division of the *CLEAVER-BROOKS CO.*

▶ *JOHNS-MANVILLE* is currently observing its 100th anniversary. The centennial year sees eight new manufacturing plants in production.

▶ *LINCOLN BOUILLON, HERBERT T. GRIFFITH,* and *L. F. CHRISTOFFERSON* have announced the formation of a new partnership to take over all of the activities of the previous partnership of *BOUILLON AND GRIFFITH.* The new partnership will operate under the firm name of *BOULLION, GRIFFITH & CHRISTOFFERSON, CONSULTING ENGINEERS.* Partners will be Mr. Bouillon, Mr. Griffith, Mr. Christofferson, and *ROBERT H. SCHAIRER.*

▶ *NOVELTY STEAM BOILER WORKS, INC.,* a subsidiary of *ELLICOTT MACHINE CORP.,* has been renamed *ELLICOTT FABRICATORS, INC.*

No. 1 of a Series

PACKAGED COMBUSTION by Webster

The KINEPACK*

A completely piped, wired and tested factory assembly consisting of the famous WEBSTER KINETIC Gas Burner, manual firing valve, automatic diaphragm gas valve and an electronic combustion safeguard system incorporating the RA680 cabinet.

Available in three sizes with eight capacities from 800,000 to 3,260,000 Btu/hr.

Write for illustrated Bulletin # B8/30

COMBUSTION EQUIPMENT
ENGINEERED BY THE WEBSTER ENGINEERING COMPANY

The WEBSTER ENGINEERING Company
TULSA 16, OKLAHOMA
Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

★ Trade Mark

here's SOUND ADVICE on *effective* ROOF VENTILATORS

PENN
DOMEX
ROOF
EXHAUSTERS..

Specified recently for
U. S. AIR FORCE ACADEMY
COLORADO SPRINGS, COL.

.. feature .. Skyline Stylishness .. High Performance .. and durable, bright aluminum housings.

Domexes recent development is the "Significant Scroll", a deep, one-piece spun inlet—exclusive with Penn RB and QB series—providing *proper design,* quiet operation and certified capacities.

CERTIFIED RATINGS
AUTHORIZED BY
AMCA

and for SOUND CONTROL specify

PENN'S
SONOTROL
SOUND BARRIER
CURB

.. A factory fabricated roof curb combining structural stability and sound attenuating quality definitely superior to field constructed curbs. The Sonotrol is priced competitively with on-the-job constructed curbs, it also defines and stabilizes dimensions. It is an excellent companion piece for all motor driven exhausters. The Penn Ventilator Man in your area has complete details. Contact him for a copy of the Electrical Testing Laboratories' report on the Sonotrol Curb.

Detailed information on the Domex and Sonotrol Curb is available from your local representative or write direct.

PENN VENTILATOR CO. Inc.
PHILADELPHIA 40, PENNA.
Representatives and Distributors in Principal Cities.

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proved
by
controlled
laboratory
test

stronger

than standard or extra strength clay pipe

Just how permanent is a Therm-O-Tile installation may be gauged from Therm-O-Tile's strength. For Therm-O-Tile is **extra** strong — actually stronger than extra strength clay pipe! Substantiating this claim are the results of exacting tests conducted under rigid laboratory conditions by an independent testing laboratory. Write for complete strength-test data.

Therm-O-Tile

conduit system
FOR UNDERGROUND PIPING

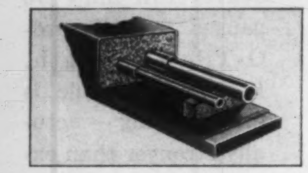
H. W. PORTER CO., INC. — NEWARK 12, NEW JERSEY
or Subsidiary
REID HAYDEN, INC.—BALTIMORE • CHARLOTTE • RICHMOND

THE BIG NEWS IS OUT!

NOW! ...there's a custom-built underground

"Z"crete®

hot pipe insulating system for your need!

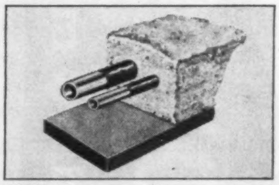


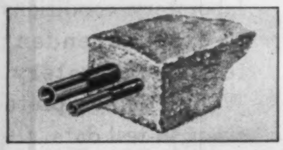
◀ some jobs need

the supporting base pad and waterproofing envelope system... has strength, load bearing, and extreme water protection for bad ground and water conditions.

some jobs need ▶

the base pad system. Provides a continuous stable base in uncertain soil, undependable fill ground conditions, when average water table level is below the bottom of the conduit.





◀ some jobs need

the b-t-u system. No base pad or external waterproofing. For use where ground is uniform and stable and average water table level is below bottom of conduit.

...and Z-crete has them all!

Now you may choose a reliable Z-crete System for ANY size job, ANY sub-surface condition. Z-crete installations are made by authorized, trained applicators, licensed under Z-crete patents (U.S. #2355966, Canadian #439356). Continuing research and field tests have greatly extended the applicability of the Z-crete System. New blends of portland cement and admixes, and new structural methods, provide even greater water resistance, thermal values and structural strength.

FOR EASY DESIGN AND SPECIFICATION MAIL COUPON, GET TESTED DATA

ZONOLITE COMPANY, Z-crete Div., Dept. HPAC-38
135 S. LaSalle St., Chicago 3, Ill.
Send me Z-crete data folders Z-1 and Z-12.

*Name*____________________
*Firm*____________________
*Address*____________________
*City*__________ *Zone*____ *State*________

INSTALLED BY LICENSED APPLICATORS

WE HEAR THAT

Continued

▶ *WESTERN AIR CONDITIONING INDUSTRIES ASSOCIATION* announced a financial contribution to California State Polytechnic College to further dissemination of information to precollege students on opportunities offered by the air conditioning and refrigeration field.

▶ Through an exchange of common stock, *AMERICAN AIR FILTER CO., INC.* has formally completed the acquisition of *KENNARD CORP.*, St. Louis manufacturer of heating and cooling coils, and heating, ventilating and cooling units.

▶ *INSTITUTE OF HEATING AND AIR CONDITIONING INDUSTRIES OF SOUTHERN CALIFORNIA* has opened new modern office headquarters at 1254 W. Manchester Ave., Los Angeles.

▶ *READING TUBE CORP.* has opened a sales office and a 12,000 sq ft distribution depot in leased quarters in Philadelphia.

▶ *NU-WAY CORP.* has announced a change in control and management. W. F. Klockau, president, and O. K. Gipple, executive vice president and treasurer, have sold their interests in the company. The new executives are: J. E. Rettke, president; John W. Olson, vice president and sales manager; and Russell E. Parmenter, secretary-treasurer.

▶ *CARLON PRODUCTS CORP.* has started construction on a $500,000 plant at Aurora, Ohio to increase manufacturing facilities for Carlon sewer and drain pipe.

▶ *MARLO COIL CO.* has transferred its operations to a new plant and office building at 7100 S. Grand Blvd., at Blow St., St. Louis 11. The new one-story building has 120,000 sq ft of office and production area.

▶ *TRANE COMPANY's* new $1.2 million manufacturing plant at La Crosse, Wis., has just commenced operation. The 76,800 sq ft plant will be used in the production of heat exchangers.

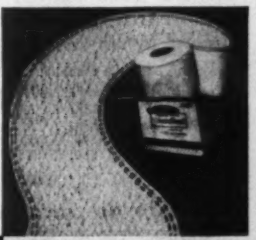
▶ A new 6000 sq ft research and engineering facility has recently been acquired by the *A. W. CASH VALVE MFG. CORP.*

▶ An open house was held at the new Jessup plant by the *BALTIMORE AIRCOIL CO.* on February 1, marking the 20th anniversary of the founding of the company. ⌗

THESE
Grant Wilson
PRODUCTS

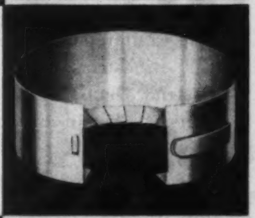
Complete the job...give it that "*custom*" look...that extra measure of efficiency!

FLEXI-DUCT...
The original flexible asbestos duct connector that stops *more* noise, costs little, installs easily. Meets National Board of Fire Underwriters' requirements.



DUX-SULATION...
The duct insulation specified when nothing but the best procurable is desired—costs more and worth it. A complete package—maximum efficiency, lifetime service.

PIPE COVERING PROTECTOR CUPS...
The all-aluminum adjustable cup that protects exposed ends of pipe covering—the finishing touch on all pipe insulating jobs



VIBRA-STOP..
Type A (asbestos) and Type C (canvas)—both punch-lock sealed to No. 1 prime galvanized metal. Underwriters' grade asbestos and canvas meets Fed. Specs. MIL-C-4177 and MIL-D-10860. Both 24 and 26 gauge metal, 25, 50 and 100 foot rolls.

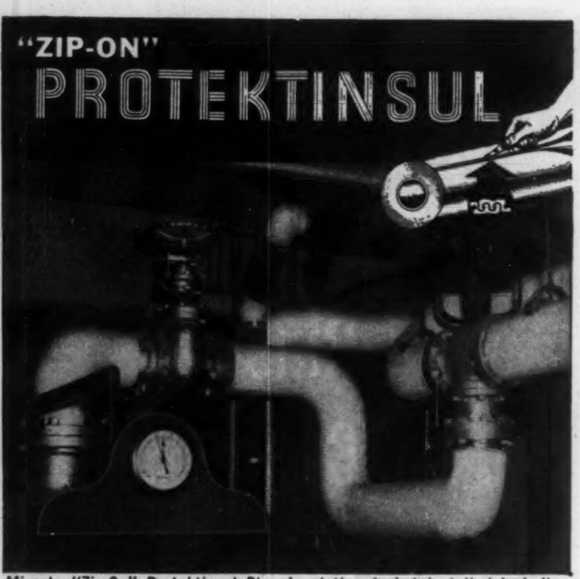
Grant Wilson inc.
ASBESTOS and INSULATING MATERIALS
141 W. JACKSON BLVD., CHICAGO 4, ILLINOIS

DUST-magnet Filters Rinse Clean *Fast!*

A DUST-magnet is the one filter you don't have to throw away when it's dust-laden. Simply rinse in lukewarm water, shake, and return to service. Normal cleaning only takes a minute. No messy oils or coating necessary. DUST-magnet is the electrostatic air filter designed for a lifetime of service!

DUST-magnet
1545 Kingsbury Street, Chicago 22

A product of Stoddard Industries



Miracle "Zip-On" Protektinsul Pipe Insulation Jacket installed in boiler room of Esso Bayway Community Center, Elizabeth, N. J.

Easy "Zip-On" installation ■ No maintenance painting ■ Excellent appearance ■ Non-inflammable ■ Chemical and mildew proof ■ Perfect vapor barrier.

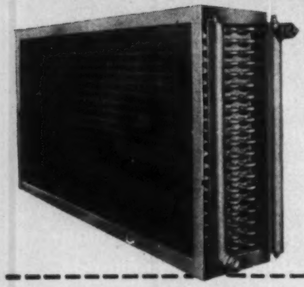
FREE: Colorful, illustrated PROTEKTINSUL brochure, no obligation.

MIRACLE ADHESIVES CORPORATION
250 Pettit Avenue Bellmore, L. I., N. Y.

... BUILT FOR
Outstanding Performance

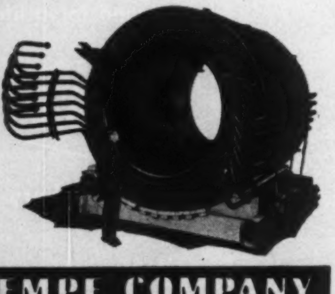
REMPE COILS

Designed to rigid specifications to insure long, trouble-free life.



FIN TYPE COILS

For Air Conditioning, Refrigeration and Heating — available in copper or steel hot galvanized — any size, any style.



PIPE COILS

Complicated assemblies or production runs of coils or bends from any type of pipe or tubing.

Send details for prompt quotation

REMPE CO.

REMPE COMPANY
342 N. Sacramento Blvd., Chicago 12, Ill.

MEETINGS & CONVENTIONS

1958

MARCH 17-21—*National Association of Corrosion Engineers,* 14th annual conference and exposition. Civic Auditorium, San Francisco. NACE headquarters: 1061 M & M Bldg., Houston 2.

MARCH 17-21—1958 *Nuclear Congress.* International Amphitheater, Chicago. Information: Engineers Joint Council, 29 W. 39th St., New York 18.

MARCH 26-28—*American Power Conference,* 20th anniversary meeting. Hotel Sherman, Chicago. Sponsored by Illinois Institute of Technology. Information: R. A. Budenholzer, conference director, Mechanical Engineering Dept., Illinois Institute of Technology, 3300 Federal St., Chicago 16.

MARCH 31-*APRIL* 2—*First Annual Texas Conference on the Utilization of Atomic Energy.* College Station, Texas. Sponsored by Texas A & M College System, College Station, Texas.

MARCH 31-*APRIL* 2—*Gas Appliance Manufacturer's Association,* annual meeting. The Greenbrier, White Sulphur Springs, W. Va. GAMA headquarters: 60 E. 42nd St., New York 17.

APRIL 21-26—*National Industrial Health Conference.* Haddon Hall, Atlantic City, N. J. Joint meeting of American Industrial Hygiene Association, American Conference of Governmental Industrial Hygienists, Industrial Medical Association, American of Industrial Dentists, American Association of Industrial Nurses. Advance registration—Room 1300, 28 E. Jackson Blvd., Chicago 4.

MAY 4-7—*Air-Conditioning and Refrigeration Institute,* annual meeting. The Homestead, Hot Springs, Va. ARI headquarters: 1346 Connecticut Ave., N. W., Washington 6, D. C.

MAY 7-11—*Western Air Conditioning, Heating, Ventilating and Refrigeration Exhibit and Conference.* Shrine Exposition Hall, Los Angeles. Sponsored by Western Air Conditioning Industries Association. Information: Fred J. Tabery, exhibit manager, 3443 S. Hill St., Los Angeles 7.

MAY 8-10—*Sheet Metal and Air Conditioning Contractors' National Association, Inc.,* annual convention. Eden Roc Hotel, Miami Beach. Information: Joseph D. Wilder, executive secretary, 170 Division St., Elgin, Ill.

stop the high cost of corrosion

in closed recirculating water systems with CORROSION INHIBITOR CS

Corrosion Inhibitor CS has a special auxiliary inhibitor that gives corrosion protection to brass and copper as well as to other metals normally found in closed systems. This unique property of Corrosion Inhibitor CS assures complete corrosion control with the result that maintenance costs are lowered, pipe replacements and equipment failures are reduced.

Corrosion Inhibitor CS has no tendency to sludge or scale at high concentrations. It will not stain and does not affect normal skin. CS treatment is compatible with common antifreeze. It provides positive protection for systems in standby.

If you have a corrosion problem in any type of closed recirculating water system, write for our free bulletin. Learn how Corrosion Inhibitor CS can help stop the high cost of corrosion.

Corrosion Inhibitor CS stops pitting like this as well as other forms of corrosion.

HAGAN CHEMICALS & CONTROLS, INC.

HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
DIVISIONS: CALGON COMPANY, HALL LABORATORIES
IN CANADA: HAGAN CORPORATION (CANADA) LIMITED, TORONTO

Write for new Bulletin!

WILSON
CENTRIFUGAL BLOWDOWN
SEPARATOR

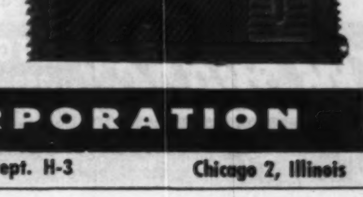
SOLVES BOILER BLOWDOWN DISPOSAL PROBLEMS

Here is the safe, economical way to handle boiler blowdown . . . at atmospheric pressure. Steam flash is instantaneously cleared through the large top vent pipe. Water and sludge fall by gravity through bottom drain. No objectionable noise. Install where convenient, inside or out—even on boiler room roof. One Wilson Separator can handle two or more boilers in battery, if desired. Special models with flanged or butt welding connections available.

- **MEETS REQUIREMENTS OF A.S.M.E. UNFIRED PRESSURE VESSEL CODE**
- **SIMPLE TO INSTALL**
- **REQUIRES NO MAINTENANCE**
- **THOUSANDS IN SERVICE**

WILSON ALL-CAST ALUMINUM RADIATION ELEMENTS

. . . provide maximum heat transfer with minimum weight. Rugged construction with high resistance to corrosion or electrolytic deterioration. You gain these advantages in Wilson Aftercoolers, Unit Heaters and other radiation products.



WILSON ENGINEERING CORPORATION

6 North Michigan Avenue Dept. H-3 Chicago 2, Illinois

NEW IMPROVED FORMULA

Look for *new* **KEY-TITE** on your distributor's shelf or catalog list. Now, even MORE PLIABLE . . . and even LONGER CAN LIFE . . . plus the same POSITIVE SEALING action that made it famous for forty years.

New Formula **KEY-TITE** is easily applied, will not seize the joint, will not squeeze out.

Use **KEY-TITE** for the finest possible sealing of water, gas, low-pressure steam lines.

Seal Right with **KEY-TITE** Water Proof Pipe Joint Compound. Order from YOUR Supply Store or write for free sample.

Address Dept. BB-3

KEY-TITE
NEW IMPROVED FORMULA

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DIVISION OF acf INDUSTRIES
INCORPORATED
PLANT: MISSOURI CITY, TEXAS
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Monarch NOZZLES For HUMIDIFYING

Monarch Brass F-80 Air Conditioning Nozzles (or ¼" male one-piece H-261 style) produce the finest possible breakup of small capacities with low direct pressure only. No air required.

The most popular size is #3.00 which operates on as little as 25 pounds pressure, delivers 1.00 gph and produces a very wide angle of spray (120°) in a fine, soft, fog-like mist.

Available in 25 different capacity sizes from .57 gph upwards, all Brass construction with 120 mesh Monel screen strainers.

WRITE FOR CATALOG I

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PHILADELPHIA 34, PA.

Canadian Agents (Except B. C.)
E. S. Gallagher Sales Ltd. Toronto 12, Canada

MEETINGS & CONVENTIONS

Continued

1958

MAY 11-14—*Fluid Controls Institute, Inc.* Lake Placid Club, Lake Placid, N. Y. Information: Fluid Controls Institute, Inc., P. O. Box 191, Decatur, Ill.

MAY 19-23—*National Fire Protection Association*, 62nd annual meeting. Palmer House, Chicago. The association is at 60 Batterymarch St., Boston.

MAY 20-23—*Mechanical Contractors Association of America, Inc.*, 69th annual convention. Ambassador Hotel, Los Angeles. Information: MCAA headquarters, 45 Rockefeller Plaza, New York 20.

JUNE 2-5—*National District Heating Association*, 49th annual meeting. French Lick-Sheraton Hotel, French Lick, Ind. Information: John F. Collins, Jr., secretary-treasurer, 827 N. Euclid Ave., Pittsburgh 6.

JUNE 9-13—*Fourth International Automation Exposition and International Automation Congress.* Coliseum, New York. Information: Richard Rimbach Assoc., 845 Ridge Ave., Pittsburgh 12.

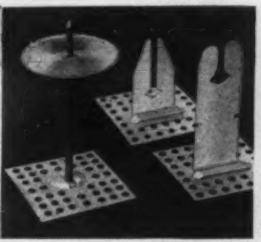
JUNE 9-13—*Seminar on Electrical Precipitation Equipment.* Pennsylvania State University. Information: Extension Conference Center, Pennsylvania State University, University Park, Pa.

JUNE 23-25—*American Society of Heating and Air-Conditioning Engineers, Inc.* and *American Society of Refrigerating Engineers*, simultaneous meeting. ASHAE meeting at Pick-Nicollet Hotel, Minneapolis. ASHAE headquarters: 62 Worth St., New York 13. ASRE meeting at Hotel Leamington, Minneapolis. ASRE headquarters: 234 Fifth Ave., New York 1. For further details see page 167.

DEC. 1-3—*American Society of Refrigerating Engineers*, semi-annual meeting. Hotel Roosevelt, New Orleans. Information: 234 Fifth Ave., New York 1.

1959

JAN. 26-30—*14th International Heating and Air-Conditioning Exposition.* Philadelphia. Under auspices of the American Society of Heating and Air-Conditioning Engineers, in conjunction with its 65th annual meeting, also in Philadelphia. Exposition management: International Heating and Air-Conditioning Exposition Co., 480 Lexington Ave., New York 17. ASHAE headquarters: 62 Worth St., New York 13. ⩩



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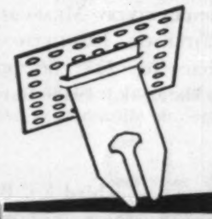

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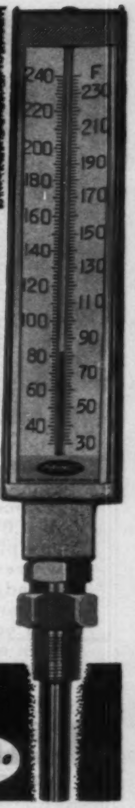

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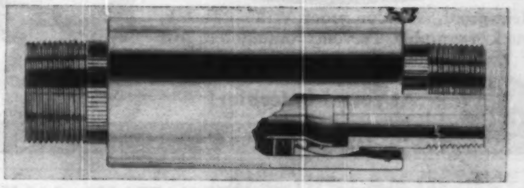

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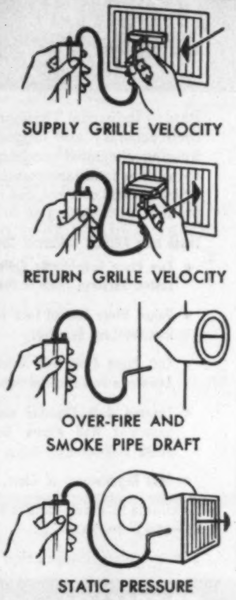

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POLICY STATEMENT ON AIR POLLUTION AND ITS CONTROL — Prepared by Air Pollution Committee of EJC. Engineers Joint Council, 29 W. 39th St., New York 18. 5c.

THERMAL RESISTANCE OF AIRSPACES AND FIBROUS INSULATIONS BOUNDED BY REFLECTIVE SURFACES — Building Materials and Structures Report 151. By H. E. Robinson, L. A. Cosgrove, F. J. Powell. 24 pp. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 20c.

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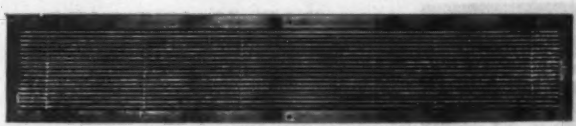

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Among the Technical Data Section revisions and additions are (1) addition of both a description and a design method for high velocity air duct systems, (2) an enlarged section on the heat pump, (3) new information on exhaust hood performance and design for hot and cold processes, (4) a simplified presentation of industrial drying principles, calculations, and system design, (5) extension of data on heavy fuel oils and their use, with preheating, in automatic fuel burning equipment, (6) new data on heat gain through glass block used in skylights, requirements for shading glass, and basic principles involved in calculating heat flow through glass areas, (7) a general revision of the chapter on radiators, convectors, baseboard and finned-tube units and addition of new data on their ratings, and performance, (8) a revision of ranges of capacity for electrical heating units and a method of determining operating cost for these units, (9) an enlarged section on performance and testing of air cleaners, (10) extension of list of allowable concentrations of air contaminants, (11) and increased number of codes and standards of interest to users of THE GUIDE.

These changes appear in the following chapters: *Chapter 8 — Air Contaminants; Chapter 13 — Cooling Load; Chapter 14 — Fuels and Combustion; Chapter 15 — Automatic Fuel Burning Equipment; Chapter 16 — Heating Boilers, Furnaces, Space Heaters; Chapter 22 — Radiators, Convectors, Baseboard and Finned-Tube Units; Chapter 29 — Central Systems for Air Conditioning; Chapter 31 — Air Duct Design; Chapter 33 — Air Cleaning; Chapter 36 — Refrigeration; Chapter 41 — Electric Heating; Chapter 45 — Industrial Exhaust Systems; Chapter 47 — Industrial Drying Systems; and Chapter 53 — Codes and Standards.*

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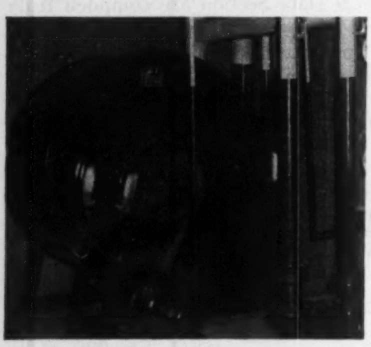

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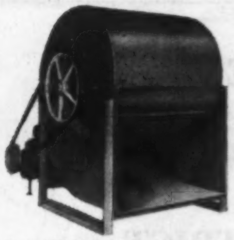
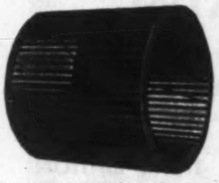


Type WD, DWDI centrifugal fan.



Type FC, DWDI fan wheel.

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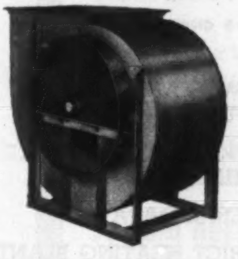
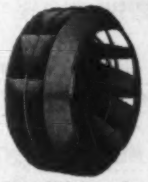
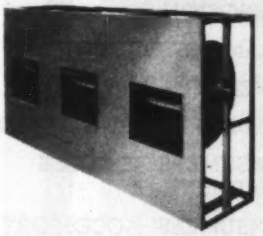


Type BBC, SWSI arrangement 3 fan.



Type BBC fan wheel, SWSI class 2.



Triple BFC Blower Assembly.

Type W, DWDI light duty fan housing.

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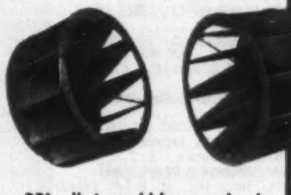

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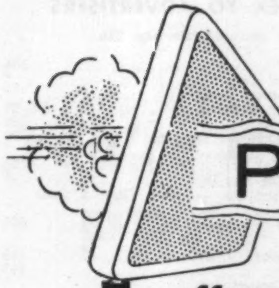

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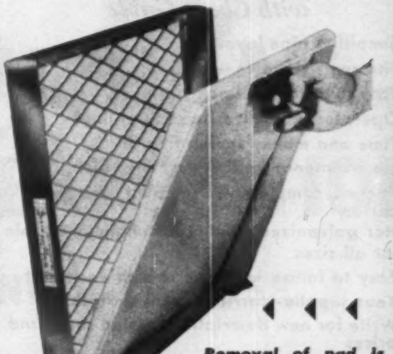

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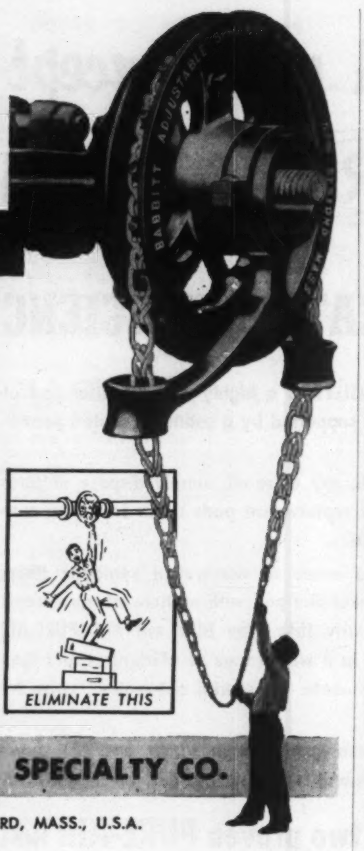

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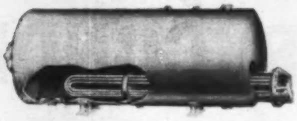

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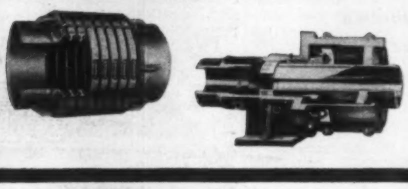

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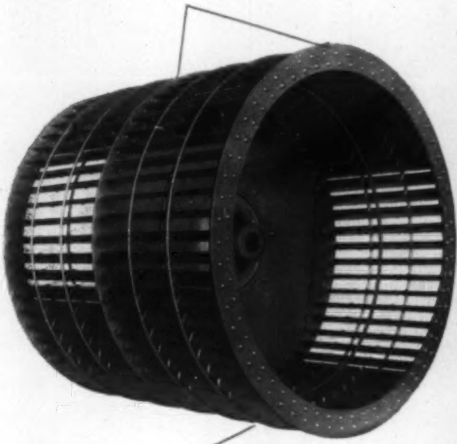

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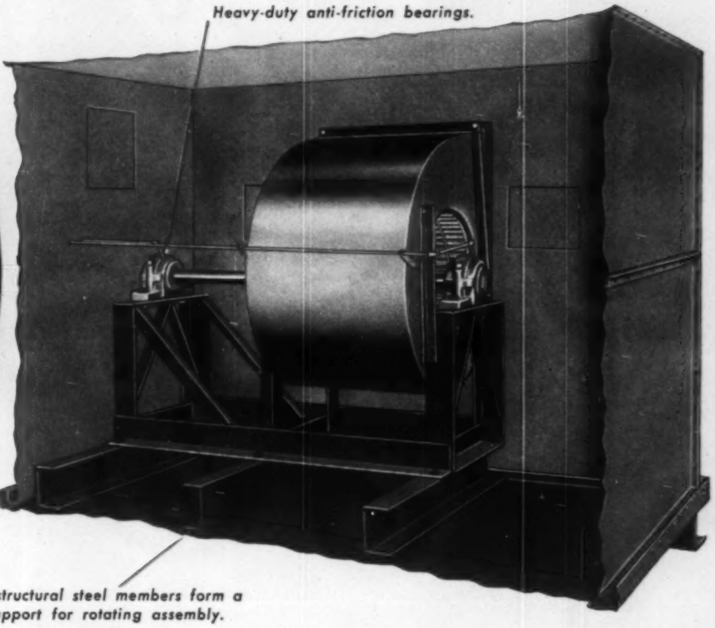

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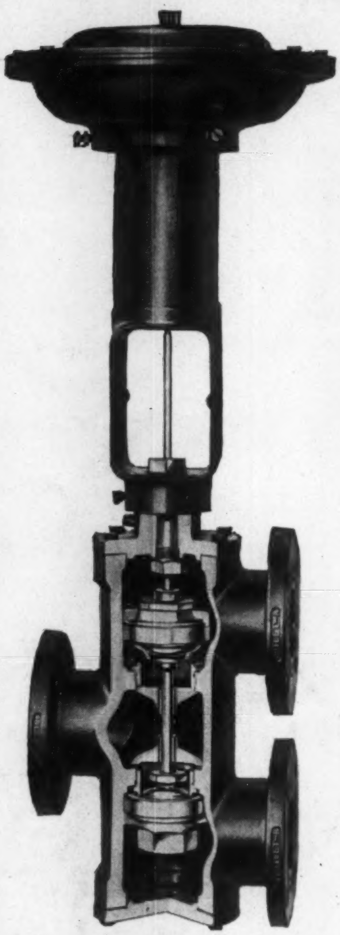
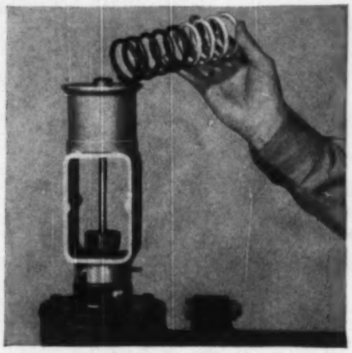
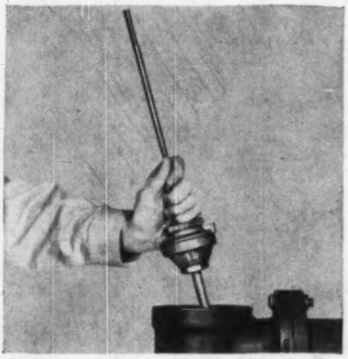


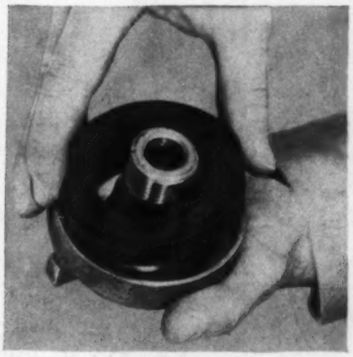


1. While valve remains installed, top and spring assembly are removed.

2. Bottom cap and lower disc holder are removed.



3. Upper disc holder assembly is then lifted out.



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